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1/24/78

# 45th
# market statistics issue

retail sales
latest import-export data
equipment on farms
shipments

BEST AVAILABLE COPY

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November 1982 • Vol. 97 • No. 19

## 45th ANNUAL STATISTICS ISSUE

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**On the cover...** This photo of a Versatile 1150 tractor, taken last December as an Arizona sunrise was not far away, suggests the industry's position today: In the darkest moments before a bright dawn, we're already at work preparing for major opportunities. The photo originally appeared in Versatile Corp.'s 1981 annual report.

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# What's Ahead...

I&T
SINCE 1886

November 1982

RETAIL SALES OF FARM EQUIPMENT IN THE U.S. continued down in September, though not as severely in some product categories as in prior months.

|  | Unit Retail Sales |  |  |  |  |  |
|---|---|---|---|---|---|---|
|  | September |  |  | January-September |  |  |
|  | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: |  |  |  |  |  |  |
| 2-wheel drive |  |  |  |  |  |  |
| 40-100 hp | 3,713 | 3,530 | + 5.2 | 31,971 | 39,230 | -18.5 |
| Over 100 hp | 2,120 | 2,993 | -29.2 | 22,351 | 30,853 | -27.6 |
| Total 2-wheel drive | 5,833 | 6,523 | -10.6 | 54,322 | 70,083 | -22.5 |
| 4-wheel drive | 520 | 729 | -28.7 | 5,076 | 7,138 | -28.9 |
| Total Tractors | 6,353 | 7,252 | -12.4 | 59,398 | 77,221 | -23.1 |
| Combines (S-P) | 1,823 | 2,774 | -34.3 | 9,212 | 15,853 | -41.9 |
| Balers* | 729 | 1,108 | -34.2 | 7,892 | 11,950 | -34.0 |
| Forage Harvesters** | 885 | 1,267 | -30.1 | 3,717 | 5,257 | -29.3 |
| Mower Conditioners | 1,036 | 1,613 | -35.8 | 12,313 | 16,277 | -24.4 |

*Bales under 200 lbs. **Shear-bar type

IN CANADA, RETAIL SALES TURNED UP IN SEPTEMBER:

|  | Unit Retail Sales |  |  |  |  |  |
|---|---|---|---|---|---|---|
|  | September |  |  | January-September |  |  |
|  | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: |  |  |  |  |  |  |
| 2-wheel drive |  |  |  |  |  |  |
| 40-100 hp | 951 | 810 | +17.4 | 6,361 | 7,978 | -20.3 |
| Over 100 hp | 693 | 613 | +13.0 | 4,213 | 6,146 | -31.5 |
| Total 2-wheel drive | 1,644 | 1,423 | +15.5 | 10,574 | 14,124 | -25.1 |
| 4-wheel drive | 259 | 290 | -10.7 | 2,221 | 3,009 | -26.2 |
| Total Tractors | 1,903 | 1,713 | +11.1 | 12,795 | 17,133 | -25.3 |
| Mower Conditioners | 221 | 290 | -23.8 | 2,393 | 3,461 | -30.9 |
| Balers: under 200 lbs. | 255 | 343 | -25.7 | 1,899 | 2,738 | -30.6 |
| over 200 lbs. | 295 | 425 | -30.6 | 1,859 | 2,761 | -32.7 |
| Forage Harvesters* | 150 | 150 | ----- | 565 | 956 | -40.9 |
| Combines: Pull-Type | 473 | 398 | +18.8 | 1,203 | 1,979 | -39.2 |
| S-P | 996 | 803 | +24.0 | 2,153 | 3,268 | -34.1 |
| Swathers: Pull-Type | 1,016 | 767 | +32.5 | 3,037 | 3,884 | -21.8 |
| S-P | 877 | 1,000 | -12.3 | 2,520 | 3,506 | -28.1 |

*Shear-bar type

THE USDA'S ALL-CROPS INDEX NOW STANDS AT A RECORD 118. As of October, corn production is now seen at 8.31 billion bu.--yielding 114.2 bu. per acre, a record high and up 4.3 bu. from the previous peak last year. All wheat production is now seen at 2.81 billion bu.--35.6 bu. per acre, a record high, though winter wheat at 36 bu. was less than the record 36.9 bu. per acre set in 1979. Soybean output is seen at 2.3 billion bu., averaging 32.4 bu. per acre, another yield record.

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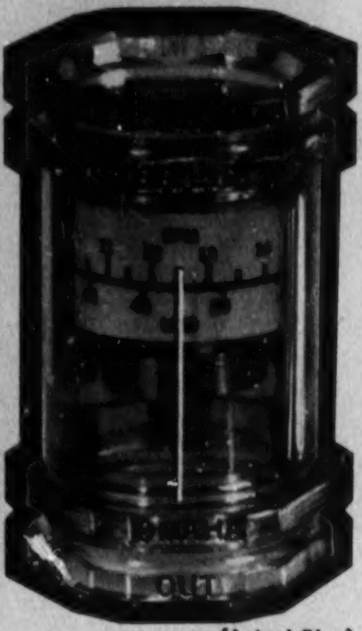
INEXPENSIVE FLOW METER REDUCES HYDRAULIC PROBLEMS



(Actual Size)

The new FM Flow Meter from Brand is so inexpensive you can make it a permanent part of your hydraulic system. Install it in the return line and you can anticipate the majority of hydraulic breakdowns before they happen. A low-pressure instrument, manufactured from high impact polysulfone, it's the ultimate preventive maintenance tool for hydraulic systems. The FM Flow Meter features direct-reading scale with ± 2.5% accuracy. It is available with 15 or 30 gallon scales and a variety of fittings to adapt to most installations.

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BRAND HYDRAULICS

(402) 344-4434
Dept. T 2332 S. 25th St.
Omaha, NE 68105

Circle (15) on Reply Card

| | Two-Wheel-Drive Tractors | | | | | | |
|---|---|---|---|---|---|---|---|
| State | 40-49 | 50-59 | 60-69 | 70-79 | 80-99 | 100-119 | 120-139 |
| Alabama | 465 | 240 | 171 | 200 | 177 | 146 | 24 |
| Alaska | 19 | 21 | 4 | 1 | 5 | 3 | ..... |
| Arizona | 40 | 35 | 61 | 61 | 151 | 155 | 12 |
| Arkansas | 551 | 289 | 264 | 99 | 137 | 94 | 23 |
| California | 419 | 327 | 812 | 856 | 628 | 273 | 46 |
| Colorado | 70 | 90 | 88 | 24 | 94 | 92 | 36 |
| Connecticut | 36 | 46 | 41 | 7 | 20 | 12 | ..... |
| Delaware | 14 | 15 | 13 | 12 | 11 | 9 | 6 |
| Florida | 497 | 260 | 362 | 371 | 334 | 224 | 21 |
| Georgia | 628 | 264 | 271 | 181 | 253 | 147 | 50 |
| Hawaii | 21 | 9 | 6 | 11 | 8 | 1 | ..... |
| Idaho | 50 | 92 | 119 | 47 | 205 | 186 | 103 |
| Illinois | 189 | 194 | 328 | 273 | 371 | 420 | 171 |
| Indiana | 149 | 170 | 235 | 140 | 251 | 224 | 84 |
| Iowa | 73 | 133 | 288 | 231 | 625 | 768 | 239 |
| Kansas | 91 | 79 | 153 | 84 | 247 | 388 | 175 |
| Kentucky | 806 | 645 | 554 | 280 | 362 | 154 | 30 |
| Louisiana | 608 | 226 | 258 | 151 | 134 | 156 | 26 |
| Maine | 69 | 33 | 47 | 9 | 32 | 31 | 9 |
| Maryland | 109 | 84 | 75 | 38 | 91 | 62 | 11 |
| Massachusetts | 36 | 51 | 21 | 21 | 13 | 9 | ..... |
| Michigan | 213 | 277 | 338 | 198 | 337 | 268 | 94 |
| Minnesota | 81 | 182 | 363 | 213 | 688 | 616 | 212 |
| Mississippi | 419 | 226 | 219 | 129 | 166 | 160 | 39 |
| Missouri | 327 | 323 | 474 | 205 | 435 | 320 | 101 |
| Montana | 125 | 107 | 116 | 30 | 154 | 123 | 55 |
| Nebraska | 46 | 38 | 90 | 39 | 267 | 413 | 110 |
| Nevada | 7 | 16 | 12 | 3 | 13 | 6 | ..... |
| New Hampshire | 30 | 35 | 24 | 12 | 27 | 5 | 1 |
| New Jersey | 65 | 33 | 22 | 23 | 43 | 16 | 3 |
| New Mexico | 55 | 28 | 38 | 34 | 26 | 20 | 9 |
| New York | 209 | 245 | 374 | 203 | 628 | 259 | 41 |
| North Carolina | 785 | 367 | 346 | 209 | 435 | 183 | 53 |
| North Dakota | 16 | 39 | 49 | 30 | 92 | 282 | 168 |
| Ohio | 309 | 328 | 384 | 193 | 384 | 285 | 89 |
| Oklahoma | 351 | 182 | 176 | 113 | 258 | 371 | 72 |
| Oregon | 250 | 176 | 173 | 79 | 153 | 80 | 13 |
| Pennsylvania | 291 | 283 | 371 | 159 | 357 | 193 | 40 |
| Rhode Island | 6 | 2 | 2 | 1 | 1 | 2 | ..... |
| South Carolina | 270 | 151 | 131 | 96 | 127 | 52 | 19 |
| South Dakota | 14 | 35 | 65 | 41 | 208 | 301 | 90 |
| Tennessee | 746 | 420 | 336 | 164 | 242 | 174 | 34 |
| Texas | 2,000 | 1,004 | 1,019 | 712 | 928 | 968 | 180 |
| Utah | 80 | 91 | 85 | 49 | 88 | 70 | 29 |
| Vermont | 53 | 49 | 79 | 15 | 84 | 22 | 4 |
| Virginia | 462 | 300 | 250 | 111 | 240 | 97 | 25 |
| Washington | 405 | 333 | 185 | 90 | 117 | 46 | 15 |
| West Virginia | 125 | 77 | 65 | 20 | 41 | 7 | 2 |
| Wisconsin | 107 | 285 | 683 | 338 | 900 | 644 | 182 |
| Wyoming | 17 | 32 | 36 | 13 | 68 | 40 | 14 |
| U.S. Government | ..... | ..... | 7 | 2 | ..... | 6 | ..... |
| Miscellaneous | 58 | 1 | 22 | 150 | 11 | 5 | ..... |
| **TOTAL** | **12,862** | **9,268** | **10,705** | **6,471** | **11,667** | **9,588** | **2,760** |

## 1981 Retail Sales of Farm Wheel Tractors by PTO Horsepower (in units)

| | | | | | Four-Wheel Drive Tractors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 130-139 | 140-149 | 150-179 | 180 & over | Total 2-Wheel Drive | Under 200 | 200-249 | 250 & over | Total 4-Wheel Drive | All Farm Wheel Tractors | State |
| 163 | 45 | 71 | 36 | 1,738 | 9 | 9 | 10 | 28 | 1,766 | Alabama |
| 1 | ..... | 2 | ..... | 56 | ..... | ..... | 1 | 1 | 57 | Alaska |
| 151 | 45 | 60 | 43 | 814 | 31 | 31 | 23 | 85 | 899 | Arizona |
| 280 | 210 | 353 | 386 | 2,686 | 98 | 114 | 116 | 328 | 3,014 | Arkansas |
| 249 | 37 | 160 | 121 | 3,948 | 147 | 162 | 144 | 453 | 4,401 | California |
| 223 | 40 | 150 | 75 | 982 | 111 | 76 | 31 | 218 | 1,200 | Colorado |
| 7 | 2 | 3 | 1 | 175 | 2 | ..... | ..... | 2 | 177 | Connecticut |
| 15 | 1 | 12 | ..... | 108 | 1 | 2 | ..... | 3 | 111 | Delaware |
| 130 | 45 | 43 | 27 | 2,314 | 25 | 33 | 12 | 70 | 2,384 | Florida |
| 308 | 63 | 154 | 85 | 2,404 | 13 | 10 | 5 | 28 | 2,432 | Georgia |
| ..... | ..... | 3 | ..... | 59 | 1 | ..... | 6 | 7 | 66 | Hawaii |
| 241 | 63 | 171 | 10 | 1,287 | 121 | 103 | 40 | 264 | 1,551 | Idaho |
| 1,146 | 331 | 782 | 324 | 4,529 | 469 | 260 | 142 | 871 | 5,400 | Illinois |
| 503 | 151 | 328 | 164 | 2,399 | 206 | 122 | 68 | 396 | 2,795 | Indiana |
| 1,781 | 458 | 625 | 218 | 5,437 | 374 | 191 | 89 | 654 | 6,091 | Iowa |
| 691 | 126 | 363 | 249 | 2,646 | 244 | 168 | 93 | 505 | 3,151 | Kansas |
| 137 | 22 | 65 | 52 | 3,107 | 26 | 12 | 5 | 43 | 3,150 | Kentucky |
| 254 | 180 | 283 | 249 | 2,525 | 96 | 58 | 50 | 204 | 2,729 | Louisiana |
| 13 | 3 | 6 | ..... | 252 | 6 | ..... | 1 | 7 | 259 | Maine |
| 52 | 11 | 18 | 12 | 563 | 5 | 6 | 7 | 18 | 581 | Maryland |
| 2 | ..... | ..... | ..... | 153 | ..... | ..... | ..... | ..... | 153 | Massachusetts |
| 348 | 67 | 157 | 56 | 2,353 | 229 | 96 | 51 | 376 | 2,729 | Michigan |
| 1,082 | 211 | 388 | 94 | 4,130 | 346 | 182 | 117 | 645 | 4,775 | Minnesota |
| 281 | 239 | 321 | 279 | 2,478 | 52 | 48 | 71 | 171 | 2,649 | Mississippi |
| 605 | 158 | 204 | 151 | 3,303 | 138 | 69 | 59 | 266 | 3,569 | Missouri |
| 123 | 32 | 43 | 28 | 936 | 114 | 123 | 94 | 331 | 1,267 | Montana |
| 887 | 229 | 332 | 187 | 2,638 | 152 | 66 | 34 | 252 | 2,890 | Nebraska |
| 12 | ..... | 2 | 1 | 72 | 8 | 4 | ..... | 12 | 84 | Nevada |
| ..... | 1 | ..... | ..... | 135 | ..... | ..... | ..... | ..... | 135 | New Hampshire |
| 12 | 3 | 4 | ..... | 224 | ..... | ..... | ..... | ..... | 224 | New Jersey |
| 63 | 23 | 34 | 14 | 344 | 11 | 18 | 6 | 35 | 379 | New Mexico |
| 174 | 32 | 38 | 7 | 2,210 | 128 | 27 | 18 | 173 | 2,383 | New York |
| 170 | 54 | 100 | 76 | 2,778 | 32 | 13 | 5 | 50 | 2,828 | North Carolina |
| 603 | 141 | 328 | 137 | 1,885 | 388 | 292 | 207 | 887 | 2,772 | North Dakota |
| 398 | 86 | 175 | 80 | 2,711 | 206 | 81 | 56 | 343 | 3,054 | Ohio |
| 480 | 46 | 201 | 104 | 2,334 | 137 | 108 | 50 | 295 | 2,629 | Oklahoma |
| 94 | 16 | 54 | 10 | 1,098 | 64 | 29 | 20 | 113 | 1,211 | Oregon |
| 122 | 21 | 19 | 11 | 1,867 | 32 | 20 | 4 | 56 | 1,923 | Pennsylvania |
| ..... | ..... | ..... | ..... | 14 | ..... | ..... | ..... | ..... | 14 | Rhode Island |
| 84 | 26 | 41 | 52 | 1,049 | 16 | 11 | 5 | 32 | 1,081 | South Carolina |
| 425 | 68 | 168 | 35 | 1,450 | 151 | 66 | 75 | 292 | 1,742 | South Dakota |
| 282 | 55 | 129 | 71 | 2,653 | 25 | 16 | 16 | 57 | 2,710 | Tennessee |
| 1,744 | 576 | 742 | 536 | 10,409 | 276 | 198 | 106 | 580 | 10,989 | Texas |
| 54 | 5 | 21 | 11 | 583 | 14 | 4 | 6 | 24 | 607 | Utah |
| 16 | 3 | 7 | ..... | 332 | 5 | ..... | 1 | 6 | 338 | Vermont |
| 78 | 14 | 19 | 22 | 1,618 | 14 | 2 | 3 | 19 | 1,637 | Virginia |
| 116 | 9 | 50 | 5 | 1,371 | 98 | 56 | 37 | 191 | 1,562 | Washington |
| 3 | ..... | 2 | 1 | 343 | ..... | ..... | ..... | ..... | 343 | West Virginia |
| 513 | 154 | 166 | 63 | 4,035 | 166 | 59 | 30 | 255 | 4,290 | Wisconsin |
| 71 | 15 | 21 | 8 | 335 | 26 | 4 | 7 | 37 | 372 | Wyoming |
| 2 | ..... | ..... | ..... | 17 | ..... | ..... | ..... | ..... | 17 | U.S. Government |
| 5 | ..... | 6 | 7 | 265 | ..... | ..... | ..... | ..... | 265 | Miscellaneous |
| 15,174 | 4,115 | 7,444 | 4,098 | 94,152 | 4,813 | 2,949 | 1,921 | 9,683 | 103,835 | TOTAL |

**DATA:** Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers, or contractor's off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere; Deutz; Ford; International Harvester; Long; Massey-Ferguson; Steiger; Versatile; R.M. Wade (Satoh); and White. Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

# RETAIL SALES OF SELECTED FARM EQUIPMENT—Jan.-Dec. 1980 and 1981(1)

(In Units)

| | Combines Self-Propelled | | Corn Heads | | Hay Balers(2) | | Windrowers Self-Propelled Power Units | | Windrowers Self-Propelled Total Heads | | Grinder-Mixers | | Shear-Bar Forage Harvesters(3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 |
| Alabama | 245 | 261 | 66 | 61 | 153 | 221 | 2 | — | 1 | ..... | 135 | 91 | 37 | 37 |
| Alaska | 5 | 5 | ..... | ..... | 19 | 14 | 3 | ..... | 4 | — | 1 | 3 | ..... | 1 |
| Arizona | 60 | 82 | 7 | 2 | 44 | 50 | 64 | 63 | 76 | 73 | 8 | 7 | 11 | 13 |
| Arkansas | 672 | 820 | 5 | 4 | 166 | 275 | ..... | 5 | ..... | 5 | 82 | 44 | 11 | 14 |
| California | 284 | 353 | 53 | 62 | 174 | 162 | 281 | 287 | 311 | 317 | 5 | 6 | 74 | 91 |
| Colorado | 341 | 337 | 158 | 130 | 437 | 395 | 222 | 209 | 237 | 226 | 68 | 56 | 102 | 58 |
| Connecticut | ..... | 1 | ..... | 2 | 58 | 55 | ..... | ..... | ..... | ..... | 1 | 1 | 42 | 42 |
| Delaware | 43 | 30 | 44 | 32 | 15 | 8 | 1 | 1 | 1 | 1 | 8 | 10 | 12 | 3 |
| Florida | 78 | 64 | 51 | 30 | 77 | 86 | ..... | 2 | ..... | 2 | 46 | 16 | 26 | 34 |
| Georgia | 384 | 458 | 302 | 215 | 197 | 244 | 1 | ..... | 1 | ..... | 265 | 97 | 105 | 93 |
| Hawaii | ..... | ..... | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... |
| Idaho | 440 | 443 | 22 | 14 | 600 | 495 | 404 | 291 | 413 | 306 | 66 | 31 | 75 | 41 |
| Illinois | 2,708 | 2,734 | 2,621 | 2,683 | 327 | 246 | 23 | 11 | 23 | 13 | 496 | 365 | 261 | 214 |
| Indiana | 1,489 | 1,315 | 1,615 | 1,345 | 316 | 303 | 8 | 8 | 8 | 8 | 390 | 229 | 191 | 128 |
| Iowa | 2,928 | 2,966 | 3,108 | 3,182 | 328 | 304 | 137 | 129 | 145 | 141 | 1,290 | 954 | 565 | 390 |
| Kansas | 1,888 | 1,766 | 343 | 209 | 312 | 343 | 290 | 281 | 300 | 298 | 252 | 163 | 263 | 178 |
| Kentucky | 363 | 364 | 284 | 238 | 292 | 332 | 3 | 27 | 3 | 30 | 306 | 187 | 182 | 159 |
| Louisiana | 447 | 416 | 3 | 5 | 68 | 121 | ..... | ..... | ..... | ..... | 21 | 13 | 19 | 11 |
| Maine | 7 | 6 | ..... | 4 | 70 | 76 | 2 | ..... | 2 | ..... | 1 | 2 | 46 | 37 |
| Maryland | 149 | 146 | 171 | 167 | 118 | 90 | 13 | 7 | 14 | 7 | 39 | 27 | 77 | 72 |
| Massachusetts | ..... | ..... | ..... | ..... | 50 | 45 | 6 | ..... | 6 | ..... | 3 | ..... | 39 | 33 |
| Michigan | 596 | 595 | 566 | 581 | 382 | 286 | 64 | 45 | 65 | 46 | 263 | 181 | 420 | 296 |
| Minnesota | 1,652 | 1,619 | 1,461 | 1,377 | 735 | 673 | 648 | 592 | 686 | 624 | 629 | 536 | 873 | 649 |
| Mississippi | 543 | 536 | 6 | 15 | 79 | 127 | 2 | ..... | 2 | ..... | 48 | 38 | 62 | 49 |
| Missouri | 1,043 | 1,319 | 501 | 430 | 436 | 526 | 86 | 46 | 94 | 48 | 503 | 337 | 191 | 130 |
| Montana | 414 | 569 | 7 | 11 | 368 | 285 | 443 | 416 | 491 | 470 | 76 | 52 | 37 | 39 |
| Nebraska | 1,517 | 1,497 | 1,416 | 1,173 | 211 | 185 | 307 | 286 | 321 | 309 | 504 | 362 | 359 | 320 |
| Nevada | 3 | 3 | ..... | ..... | 40 | 30 | 59 | 49 | 63 | 51 | 2 | 2 | 8 | 7 |
| New Hampshire | ..... | ..... | ..... | ..... | 58 | 52 | ..... | ..... | ..... | ..... | ..... | 2 | 34 | 33 |
| New Jersey | 26 | 19 | 21 | 12 | 41 | 39 | 1 | ..... | 1 | ..... | 11 | 11 | 17 | 8 |
| New Mexico | 42 | 50 | 16 | 7 | 128 | 144 | 63 | 61 | 67 | 65 | 12 | 12 | 9 | 6 |
| New York | 191 | 206 | 243 | 266 | 769 | 588 | 69 | 53 | 70 | 54 | 129 | 117 | 853 | 776 |
| North Carolina | 419 | 462 | 400 | 420 | 303 | 287 | 2 | 1 | 2 | 1 | 162 | 118 | 96 | 97 |
| North Dakota | 1,014 | 1,352 | 58 | 124 | 58 | 69 | 588 | 762 | 639 | 850 | 146 | 111 | 144 | 197 |
| Ohio | 1,213 | 868 | 1,132 | 864 | 528 | 485 | 9 | 10 | 9 | 10 | 406 | 250 | 269 | 211 |
| Oklahoma | 642 | 650 | 23 | 13 | 407 | 504 | 104 | 113 | 111 | 119 | 131 | 84 | 38 | 34 |
| Oregon | 243 | 247 | 10 | 23 | 413 | 323 | 281 | 207 | 301 | 234 | 33 | 23 | 49 | 57 |
| Pennsylvania | 198 | 217 | 291 | 252 | 751 | 670 | 55 | 43 | 57 | 44 | 321 | 230 | 539 | 489 |
| Rhode Island | ..... | ..... | ..... | ..... | 7 | 2 | 7 | ..... | 6 | ..... | ..... | ..... | 1 | 2 |
| South Carolina | 221 | 221 | 131 | 106 | 85 | 98 | ..... | ..... | ..... | ..... | 66 | 38 | 37 | 39 |
| South Dakota | 513 | 586 | 302 | 291 | 98 | 63 | 536 | 466 | 580 | 524 | 332 | 221 | 395 | 323 |
| Tennessee | 381 | 458 | 156 | 126 | 389 | 528 | 1 | 2 | 1 | 2 | 207 | 161 | 145 | 147 |
| Texas | 974 | 1,219 | 303 | 268 | 762 | 1,120 | 86 | 93 | 91 | 106 | 250 | 170 | 85 | 84 |
| Utah | 40 | 46 | 10 | 5 | 339 | 338 | 131 | 129 | 144 | 135 | 33 | 16 | 99 | 59 |
| Vermont | 1 | 9 | 1 | 14 | 110 | 106 | 4 | 5 | 4 | 5 | ..... | 3 | 159 | 115 |
| Virginia | 125 | 159 | 127 | 129 | 393 | 303 | 7 | 10 | 7 | 11 | 97 | 79 | 202 | 164 |
| Washington | 460 | 447 | 39 | 50 | 432 | 384 | 195 | 122 | 198 | 149 | 21 | 9 | 146 | 76 |
| West Virginia | 5 | 3 | 7 | 3 | 166 | 128 | 1 | ..... | 1 | ..... | 28 | 15 | 31 | 29 |
| Wisconsin | 675 | 620 | 832 | 717 | 1,481 | 1,207 | 394 | 290 | 403 | 300 | 542 | 425 | 1,978 | 1,499 |
| Wyoming | 59 | 60 | 14 | 16 | 192 | 210 | 197 | 167 | 213 | 176 | 27 | 20 | 45 | 20 |
| U.S. Government | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Miscellaneous (4) | ..... | 3 | 7 | 22 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| **TOTAL** | 25,741 | 26,831 | 17,154 | 15,700 | 14,022 | 13,647 | 5,802 | 5,291 | 6,152 | 5,760 | 8,468 | 5,945 | 9,461 | 7,604 |

Data released Feb. 22, 1982, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

| Mower Conditioners All Types | | Manure Spreaders Conveyor-Type | | |
|---|---|---|---|---|
| 1980 | 1981 | 1980 | 1981 | |
| 141 | 172 | 18 | 17 | Alabama |
| 8 | 12 | 1 | 3 | Alaska |
| 12 | 15 | 8 | 6 | Arizona |
| 371 | 474 | 89 | 79 | Arkansas |
| 45 | 43 | 70 | 63 | California |
| 160 | 141 | 58 | 46 | Colorado |
| 96 | 55 | 64 | 60 | Connecticut |
| 19 | 10 | 58 | 45 | Delaware |
| 87 | 91 | 31 | 25 | Florida |
| 229 | 213 | 47 | 32 | Georgia |
| ..... | ..... | 1 | ..... | Hawaii |
| 167 | 151 | 137 | 104 | Idaho |
| 806 | 543 | 593 | 477 | Illinois |
| 529 | 495 | 489 | 400 | Indiana |
| 1,096 | 977 | 1,393 | 1,234 | Iowa |
| 638 | 634 | 201 | 137 | Kansas |
| 817 | 917 | 266 | 244 | Kentucky |
| 46 | 80 | 29 | 16 | Louisiana |
| 117 | 106 | 113 | 56 | Maine |
| 116 | 103 | 215 | 145 | Maryland |
| 53 | 57 | 72 | 58 | Massachusetts |
| 685 | 471 | 750 | 634 | Michigan |
| 1,062 | 988 | 1,537 | 1,204 | Minnesota |
| 101 | 105 | 19 | 17 | Mississippi |
| 1,199 | 1,461 | 321 | 252 | Missouri |
| 155 | 168 | 51 | 26 | Montana |
| 465 | 463 | 345 | 192 | Nebraska |
| 9 | 9 | 6 | 4 | Nevada |
| 75 | 56 | 59 | 37 | New Hampshire |
| 58 | 39 | 55 | 41 | New Jersey |
| 23 | 27 | 11 | 8 | New Mexico |
| 1,178 | 1,017 | 1,545 | 1,311 | New York |
| 265 | 251 | 145 | 103 | North Carolina |
| 140 | 160 | 107 | 66 | North Dakota |
| 808 | 632 | 820 | 645 | Ohio |
| 617 | 673 | 57 | 29 | Oklahoma |
| 279 | 184 | 112 | 79 | Oregon |
| 934 | 784 | 1,222 | 1,005 | Pennsylvania |
| 4 | 3 | ..... | ..... | Rhode Island |
| 79 | 135 | 30 | 14 | South Carolina |
| 91 | 134 | 216 | 175 | South Dakota |
| 569 | 755 | 156 | 123 | Tennessee |
| 1,120 | 1,467 | 144 | 139 | Texas |
| 205 | 181 | 118 | 85 | Utah |
| 250 | 195 | 223 | 202 | Vermont |
| 674 | 529 | 232 | 137 | Virginia |
| 262 | 201 | 137 | 95 | Washington |
| 177 | 152 | 64 | 61 | West Virginia |
| 2,519 | 1,895 | 2,253 | 1,814 | Wisconsin |
| 55 | 75 | 37 | 26 | Wyoming |
| ..... | ..... | ..... | ..... | U.S. Government |
| ..... | ..... | 8 | ..... | Miscellaneous |
| 19,452 | 18,521 | 14,733 | 11,773 | TOTAL |

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# Motor Vehicles and Specified Machines on U.S. Farms and Average Prices of Wheel Tractors, January 1, Designated Years[1]

| Year | Tractors (exclusive of steam & garden)[2] Thousands | Motor Trucks Thousands | Grain Combines Thousands | Corn Pickers and Picker Shellers Thousands | Pick-up Balers Thousands | Field Forage Harvesters Thousands | Garden Tractors and Motor Tillers[3] Thousands | Wheel Tractors Wholesale Prices[4] Per Unit Dollars | Horsepower Dollars |
|---|---|---|---|---|---|---|---|---|---|
| 1927 | 693 | 662 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1928 | 782 | 753 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1929 | 827 | 840 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1930 | 920 | 900 | 61 | 50 | ..... | ..... | ..... | ..... | ..... |
| 1931 | 997 | 920 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1932 | 1,022 | 910 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1933 | 1,019 | 865 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1934 | 1,016 | 875 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1935 | 1,048 | 890 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1936 | 1,125 | 923 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1937 | 1,230 | 990 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1938 | 1,370 | 1,042 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1939 | 1,445 | 1,020 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1940 | 1,545 | 1,047 | 190 | 110 | ..... | ..... | ..... | ..... | ..... |
| 1941 | 1,675 | 1,095 | 225 | 120 | ..... | ..... | ..... | ..... | ..... |
| 1942 | 1,885 | 1,160 | 275 | 130 | 25 | ..... | ..... | ..... | ..... |
| 1943 | 2,100 | 1,280 | 320 | 138 | 31 | ..... | ..... | $ 579 | $ 21 |
| 1944 | 2,215 | 1,385 | 345 | 146 | 34 | ..... | ..... | $ 658 | $ 24 |
| 1945 | 2,354 | 1,490 | 275 | 168 | 42 | 20 | 68 | $ 665 | $ 25 |
| 1946 | 2,480 | 1,550 | 420 | 203 | 54 | 25 | 80 | $ 733 | $ 28 |
| 1947 | 2,613 | 1,700 | 465 | 236 | 65 | 30 | 122 | $ 783 | $ 30 |
| 1948 | 2,821 | 1,900 | 535 | 299 | 90 | 45 | 159 | $ 890 | $ 33 |
| 1949 | 3,123 | 2,065 | 620 | 372 | 135 | 60 | 192 | $ 994 | $ 35 |
| 1950 | 3,399 | 2,209 | 714 | 456 | 196 | 81 | 216 | $ 1,073 | $ 37 |
| 1951 | 3,678 | 2,310 | 810 | 522 | 240 | 102 | 242 | $ 1,234 | $ 42 |
| 1952 | 3,907 | 2,410 | 887 | 588 | 298 | 124 | 268 | $ 1,297 | $ 42 |
| 1953 | 4,100 | 2,520 | 930 | 630 | 345 | 148 | 296 | $ 1,359 | $ 39 |
| 1954 | 4,243 | 2,610 | 965 | 660 | 395 | 175 | 315 | $ 1,513 | $ 39 |
| 1955 | 4,345 | 2,675 | 980 | 688 | 448 | 202 | 332 | $ 1,554 | $ 39 |
| 1956 | 4,480 | 2,707 | 1,005 | 715 | 505 | 220 | 353 | $ 1,682 | $ 41 |
| 1957 | 4,570 | 2,745 | 1,015 | 740 | 560 | 240 | 375 | $ 1,842 | $ 41 |
| 1958 | 4,620 | 2,775 | 1,030 | 755 | 600 | 258 | 400 | $ 2,111 | $ 46 |
| 1959 | 4,673 | 2,800 | 1,045 | 775 | 645 | 270 | 425 | $ 2,189 | $ 48 |
| 1960 | 4,688 | 2,834 | 1,042 | 792 | 680 | 291 | 450 | $ 2,338 | $ 49 |
| 1961 | 4,743 | 2,850 | 980 | 740 | 685 | 291 | 468 | $ 2,578 | $ 50 |
| 1962 | 4,763 | 2,885 | 960 | 730 | 703 | 300 | 485 | $ 2,819 | $ 51 |
| 1963 | 4,778 | 2,925 | 940 | 720 | 718 | 307 | 500 | $ 3,046 | $ 53 |
| 1964 | 4,786 | 2,970 | 920 | 705 | 734 | 312 | 513 | $ 3,443 | $ 53 |
| 1965 | 4,787 | 3,030 | 910 | 690 | 751 | 316 | 699 | $ 3,541 | $ 56 |
| 1966 | 4,783 | 3,017 | 888 | 686 | 752 | 316 | 725 | $ 3,886 | $ 58 |
| 1967 | 4,786 | 3,009 | 867 | 680 | 748 | 319 | 750 | $ 4,257 | $ 62 |
| 1968 | 4,766 | 3,016 | 847 | 673 | 739 | 321 | 770 | $ 4,709 | $ 66 |
| 1969 | 4,712 | 3,004 | 820 | 657 | 725 | 314 | 790 | $ 4,976 | $ 71 |
| 1970 | 4,619 | 2,978 | 790 | 635 | 708 | 304 | 805 | $ 5,560 | $ 76 |
| 1971 | 4,562 | 2,985 | 760 | 629 | 698 | 309 | 815 | $ 6,190 | $ 80 |
| 1972 | 4,509 | 2,993 | 725 | 625 | 687 | 315 | 825 | $ 6,486 | $ 84 |
| 1973 | 4,477 | 3,006 | 703 | 618 | 680 | 324 | 835 | $ 6,953 | $ 85 |
| 1974 | 4,478 | 3,020 | 685 | 618 | 677 | 332 | 850 | $ 7,294 | $ 86 |
| 1975 | 4,463 | 3,032 | 666 | 615 | 666 | 337 | 870 | $ 8,459 | $ 91 |
| 1976 | 4,434 | 3,043 | 647 | 610 | 642 | 342 | 890 | $11,220 | $112 |
| 1977 | 4,381 | 3,052 | 630 | 605 | 614 | 346 | 905 | $12,692 | $124 |
| 1978 | 4,350 | 3,054 | 615 | 600 | 595 | 345 | 917 | $13,431 | $144 |
| 1979 | 4,990 | 3,555 | 664 | 694 | 769 | 376 | 1,060 | $16,512 | $149 |
| 1980 | 4,960 | 3,566 | 677 | 690 | 761 | 381 | 1,075 | $18,139 | $166 |
| 1981 | 4,925 | 3,577 | 690 | 685 | 752 | 386 | 1,085 | $23,308 | $199 |
| 1982 | 4,855 | 3,585 | 698 | 680 | 742 | 388 | 1,090 | $25,941 | $204 |

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[1] SOURCE: Reports of the USDA and the Bureau of the Census. After 1959, Alaska and Hawaii are included. On-farm data after 1970, except 1975 and 19[illegible]9, are estimated by I&T.

[2] Consists of Wheel and Crawler Tractors only after 1944. Prior to 1945 some Garden Tractors may have been included but the number was small.

[3] Motor Tillers included after 1964.

[4] Estimated at wholesale level by dividing **Value of Manufacturers' Shipments** by **Units Shipped** and by **Maximum Belt Horsepower**, data are published in "Current Industrial Reports" of the Bureau of the Census.

Note: Data from the 1978 Census (Jan. 1, 1979 above) and later years, reflect changes in data collection, resulting in improved coverage by the Census and are not fully comparable with earlier years.

# Principal Machines on Farms—1982

| STATE | WHEEL AND CRAWLER TRACTORS | | | | | | TRACTOR MOLDBOARD PLOWS | |
|---|---|---|---|---|---|---|---|---|
| | 1959 Census Number | 1964 Census Number | 1969 Census Number | 1974 Census Number | 1978[1] Census Number | Estimated July 1, 1982 Number | Estimated July 1, 1968 Number | Estimated July 1, 1982 Number |
| Maine | 17,793 | 16,290 | 14,252 | 13,493 | 15,064 | 15,350 | 12,400 | 8,900 |
| New Hampshire | 6,605 | 6,253 | 4,953 | 4,989 | 5,584 | 5,960 | 4,600 | 2,770 |
| Vermont | 16,669 | 16,333 | 15,227 | 14,706 | 16,322 | 16,250 | 10,200 | 9,700 |
| Massachusetts | 12,068 | 11,575 | 9,537 | 9,341 | 10,902 | 11,500 | 8,800 | 5,930 |
| Rhode Island | 1,851 | 1,687 | 1,359 | 1,359 | 1,684 | 1,740 | 1,000 | 840 |
| Connecticut | 11,219 | 9,963 | 8,679 | 7,924 | 9,169 | 9,150 | 7,700 | 5,460 |
| New York | 138,670 | 136,304 | 122,645 | 118,313 | 128,248 | 129,100 | 107,000 | 80,000 |
| New Jersey | 24,726 | 22,042 | 19,984 | 19,324 | 22,991 | 22,830 | 21,500 | 17,000 |
| Pennsylvania | 144,759 | 144,149 | 126,810 | 124,251 | 142,844 | 145,000 | 118,600 | 98,700 |
| Delaware | 8,259 | 7,992 | 7,555 | 7,631 | 8,720 | 8,720 | 6,700 | 6,500 |
| Maryland | 37,291 | 37,203 | 34,174 | 34,705 | 40,699 | 40,900 | 30,500 | 28,200 |
| **NORTHEAST** | **419,710** | **409,791** | **365,175** | **356,038** | **402,227** | **406,500** | **329,000** | **264,000** |
| Ohio | 204,681 | 199,694 | 194,962 | 188,580 | 205,972 | 202,100 | 161,000 | 163,300 |
| Indiana | 186,853 | 181,086 | 174,055 | 167,382 | 183,002 | 179,500 | 149,000 | 145,200 |
| Illinois | 290,002 | 287,480 | 275,203 | 272,093 | 285,773 | 284,500 | 210,000 | 187,000 |
| Iowa | 327,863 | 329,172 | 318,998 | 317,052 | 328,292 | 324,800 | 235,000 | 221,200 |
| Missouri | 191,512 | 198,095 | 201,513 | 189,672 | 205,572 | 200,900 | 135,000 | 151,200 |
| **CORN BELT** | **1,200,911** | **1,195,527** | **1,164,731** | **1,134,779** | **1,208,611** | **1,191,800** | **890,000** | **867,900** |
| Michigan | 169,782 | 169,920 | 152,741 | 143,569 | 157,697 | 153,300 | 139,000 | 132,100 |
| Wisconsin | 234,387 | 247,427 | 229,752 | 237,457 | 258,119 | 260,300 | 171,000 | 168,500 |
| Minnesota | 275,833 | 284,887 | 258,614 | 260,535 | 282,533 | 283,000 | 210,000 | 187,200 |
| **LAKE STATES** | **680,002** | **702,234** | **641,107** | **641,561** | **698,349** | **696,600** | **520,000** | **487,800** |
| North Dakota | 121,039 | 122,056 | 118,069 | 123,072 | 121,966 | 122,500 | 84,000 | 70,500 |
| South Dakota | 115,639 | 120,100 | 111,532 | 114,456 | 112,782 | 111,200 | 84,000 | 70,600 |
| Nebraska | 175,254 | 180,423 | 166,098 | 170,423 | 177,691 | 179,100 | 108,000 | 97,900 |
| Kansas | 173,651 | 174,185 | 163,180 | 161,276 | 160,479 | 159,700 | 123,000 | 98,500 |
| **GREAT PLAINS** | **585,764** | **596,764** | **558,879** | **569,317** | **572,918** | **572,500** | **399,000** | **337,500** |
| West Virginia | 21,995 | 23,926 | 23,842 | 23,265 | 27,951 | 28,200 | 15,400 | 18,400 |
| Kentucky | 103,415 | 118,404 | 137,105 | 129,069 | 164,862 | 161,400 | 71,000 | 105,000 |
| Tennessee | 97,800 | 108,319 | 122,528 | 110,941 | 130,031 | 124,800 | 43,000 | 65,900 |
| Virginia | 75,143 | 78,989 | 79,347 | 76,121 | 90,284 | 88,700 | 52,000 | 62,800 |
| North Carolina | 140,639 | 149,850 | 150,825 | 130,140 | 152,917 | 143,100 | 57,600 | 72,800 |
| **APPALACHIAN** | **438,992** | **479,488** | **513,647** | **469,536** | **566,045** | **546,200** | **239,000** | **324,900** |
| South Carolina | 48,637 | 50,931 | 50,115 | 45,321 | 53,627 | 51,500 | 9,200 | 13,400 |
| Georgia | 89,392 | 89,049 | 84,366 | 77,067 | 85,049 | 82,400 | 23,500 | 33,700 |
| Florida | 35,820 | 41,295 | 42,958 | 44,192 | 57,226 | 60,200 | 12,300 | 20,300 |
| Alabama | 67,559 | 71,925 | 75,069 | 68,521 | 75,398 | 72,800 | 20,500 | 25,300 |
| **SOUTHEAST** | **241,408** | **253,200** | **252,508** | **235,101** | **271,300** | **266,900** | **65,500** | **92,700** |
| Mississippi | 84,425 | 90,347 | 88,677 | 76,808 | 80,964 | 76,800 | 29,700 | 32,500 |
| Louisiana | 53,229 | 60,618 | 63,194 | 55,933 | 64,337 | 62,500 | 15,400 | 22,600 |
| Arkansas | 83,852 | 90,993 | 86,977 | 78,083 | 89,421 | 87,100 | 41,900 | 50,100 |
| **DELTA STATES** | **221,506** | **241,958** | **238,848** | **210,824** | **234,722** | **226,400** | **87,000** | **105,200** |
| Oklahoma | 102,323 | 101,605 | 102,397 | 91,661 | 105,795 | 101,700 | 74,000 | 82,200 |
| Texas | 268,233 | 269,519 | 282,088 | 251,687 | 280,102 | 271,800 | 74,500 | 90,000 |
| **SOUTHERN PLAINS** | **370,556** | **371,124** | **384,485** | **343,348** | **385,897** | **373,500** | **148,500** | **172,200** |
| Montana | 59,510 | 61,832 | 58,729 | 58,457 | 55,941 | 58,800 | 30,500 | 28,200 |
| Idaho | 56,961 | 58,607 | 54,091 | 55,419 | 55,392 | 60,300 | 40,000 | 37,700 |
| Wyoming | 20,737 | 21,596 | 20,925 | 20,801 | 19,756 | 20,000 | 15,400 | 14,700 |
| Colorado | 64,051 | 63,906 | 59,112 | 58,091 | 59,959 | 61,400 | 34,000 | 28,600 |
| New Mexico | 17,146 | 17,919 | 15,998 | 17,021 | 17,546 | 18,200 | 11,300 | 8,700 |
| Arizona | 13,443 | 13,747 | 12,136 | 13,812 | 12,749 | 14,250 | 4,200 | 3,400 |
| Utah | 21,803 | 22,256 | 20,128 | 21,110 | 22,206 | 23,500 | 17,500 | 15,500 |
| Nevada | 5,297 | 5,557 | 5,318 | 5,515 | 5,453 | 5,850 | 3,100 | 2,700 |
| **MOUNTAIN STATES** | **258,948** | **265,420** | **246,437** | **250,226** | **249,002** | **262,300** | **156,000** | **139,500** |
| Washington | 63,114 | 65,813 | 58,600 | 59,542 | 58,190 | 68,000 | 42,000 | 40,600 |
| Oregon | 56,732 | 58,741 | 51,223 | 52,651 | 52,283 | 59,400 | 44,000 | 37,900 |
| California | 147,390 | 142,812 | 138,914 | 140,393 | 136,256 | 164,900 | 70,000 | 67,800 |
| **PACIFIC** | **267,236** | **267,366** | **248,737** | **252,586** | **246,729** | **292,300** | **156,000** | **146,300** |
| **TOTAL** | **4,684,852** | **4,782,872** | **4,614,554** | **4,463,314** | **4,835,800** | **4,835,000** | **2,990,000** | **2,938,000** |

[1] Only wheel tractors are included in the 1978 Census.

# Principal Machines on Farms—1982

| STATE | COMBINES[1] | | | | | CORN HEADS FOR COMBINES[2] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1964 Census Number | 1969 Census Number | 1974 Census Number | 1978 Census Number | Estimated July 1, 1982 Number | 1969 Census Number | 1974 Census Number | 1978 Census Number | Estimated July 1, 1982 Number |
| Maine | 875 | 218 | 242 | 415 | 430 | 120 | 141 | 192 | 200 |
| New Hampshire | 27 | 8 | 5 | 18 | 15 | 65 | 55 | 64 | 60 |
| Vermont | 344 | 113 | 87 | 170 | 165 | 175 | 238 | 375 | 410 |
| Massachusetts | 70 | 34 | 35 | 47 | 50 | 84 | 103 | 113 | 120 |
| Rhode Island | 20 | 5 | 7 | 15 | 15 | 21 | 10 | 23 | 20 |
| Connecticut | 77 | 40 | 15 | 86 | 75 | 92 | 85 | 157 | 160 |
| New York | 16,536 | 4,902 | 5,114 | 5,994 | 6,150 | 1,706 | 2,344 | 3,576 | 4,050 |
| New Jersey | 1,728 | 634 | 766 | 1,226 | 1,260 | 269 | 324 | 671 | 700 |
| Pennsylvania | 23,939 | 6,777 | 7,297 | 9,851 | 10,066 | 1,924 | 2,636 | 4,443 | 4,930 |
| Delaware | 1,780 | 979 | 1,127 | 1,351 | 1,400 | 566 | 681 | 1,035 | 1,070 |
| Maryland | 5,237 | 2,604 | 2,740 | 3,610 | 3,750 | 1,555 | 1,954 | 2,799 | 3,080 |
| **NORTHEAST** | **50,631** | **16,314** | **17,435** | **22,783** | **23,370** | **6,577** | **8,571** | **13,448** | **14,800** |
| Ohio | 50,291 | 20,805 | 26,009 | 33,996 | 35,900 | 11,892 | 17,515 | 24,522 | 27,300 |
| Indiana | 46,395 | 23,371 | 29,485 | 37,695 | 40,800 | 17,920 | 24,616 | 32,737 | 36,400 |
| Illinois | 80,857 | 48,116 | 55,085 | 63,650 | 68,700 | 37,649 | 46,362 | 56,213 | 61,500 |
| Iowa | 86,178 | 28,221 | 42,117 | 55,889 | 64,400 | 22,302 | 37,864 | 53,427 | 62,200 |
| Missouri | 44,535 | 24,208 | 26,253 | 34,029 | 35,500 | 16,112 | 18,278 | 23,544 | 24,600 |
| **CORN BELT** | **308,256** | **145,221** | **178,949** | **225,259** | **245,300** | **105,875** | **144,635** | **190,443** | **212,000** |
| Michigan | 41,360 | 13,053 | 14,649 | 19,474 | 20,350 | 4,306 | 7,098 | 11,333 | 12,970 |
| Wisconsin | 45,516 | 10,859 | 13,392 | 18,553 | 19,900 | 3,566 | 5,147 | 8,589 | 9,860 |
| Minnesota | 71,748 | 27,189 | 35,033 | 45,225 | 49,800 | 12,102 | 18,780 | 27,390 | 31,200 |
| **LAKE STATES** | **158,624** | **51,101** | **63,074** | **83,252** | **90,050** | **19,974** | **31,025** | **47,312** | **54,030** |
| North Dakota | 41,782 | 26,952 | 27,273 | 31,112 | 31,800 | 753 | 864 | 1,619 | 1,740 |
| South Dakota | 28,289 | 11,926 | 13,941 | 16,587 | 17,700 | 3,483 | 5,386 | 7,759 | 8,900 |
| Nebraska | 43,205 | 25,730 | 29,224 | 35,147 | 37,500 | 13,370 | 18,578 | 24,687 | 27,750 |
| Kansas | 59,813 | 41,601 | 41,871 | 47,650 | 48,100 | 6,533 | 8,038 | 9,282 | 10,000 |
| **GREAT PLAINS** | **173,089** | **107,209** | **112,309** | **130,496** | **135,100** | **24,139** | **32,866** | **43,347** | **48,390** |
| West Virginia | 1,020 | 245 | 307 | 479 | 490 | 147 | 199 | 265 | 300 |
| Kentucky | 9,737 | 4,565 | 6,329 | 10,760 | 11,730 | 3,196 | 4,390 | 8,510 | 9,130 |
| Tennessee | 11,537 | 5,773 | 6,843 | 10,952 | 11,620 | 2,458 | 2,734 | 5,634 | 5,800 |
| Virginia | 9,281 | 3,769 | 4,309 | 6,150 | 6,220 | 2,243 | 2,972 | 4,487 | 4,830 |
| North Carolina | 14,847 | 7,982 | 8,828 | 13,535 | 14,140 | 5,279 | 6,696 | 10,671 | 11,700 |
| **APPALACHIAN** | **46,422** | **22,334** | **26,616** | **41,876** | **44,200** | **13,323** | **16,991** | **29,567** | **31,760** |
| South Carolina | 7,085 | 4,483 | 4,706 | 6,609 | 6,740 | 1,803 | 2,285 | 3,931 | 4,130 |
| Georgia | 9,177 | 5,408 | 6,255 | 9,924 | 10,750 | 4,036 | 4,836 | 7,637 | 8,050 |
| Florida | 1,230 | 1,010 | 1,182 | 1,792 | 1,970 | 584 | 773 | 1,207 | 1,250 |
| Alabama | 4,806 | 3,423 | 3,988 | 6,958 | 7,440 | 1,635 | 1,858 | 3,468 | 3,600 |
| **SOUTHEAST** | **22,298** | **14,324** | **16,131** | **25,283** | **26,900** | **8,058** | **9,752** | **16,243** | **17,030** |
| Mississippi | 6,099 | 6,977 | 6,893 | 10,190 | 10,400 | 441 | 310 | 593 | 605 |
| Louisiana | 5,145 | 6,414 | 7,034 | 9,715 | 10,210 | 357 | 231 | 403 | 350 |
| Arkansas | 13,086 | 12,657 | 11,484 | 14,095 | 14,000 | 294 | 725 | 292 | 300 |
| **DELTA STATES** | **24,330** | **26,048** | **25,411** | **34,000** | **34,610** | **1,092** | **1,266** | **1,288** | **1,255** |
| Oklahoma | 21,668 | 14,909 | 14,797 | 18,006 | 18,050 | 457 | 511 | 900 | 930 |
| Texas | 31,355 | 21,223 | 19,394 | 23,742 | 23,150 | 1,743 | 1,858 | 3,684 | 3,930 |
| **SOUTHERN PLAINS** | **53,023** | **36,132** | **34,191** | **41,748** | **41,200** | **2,200** | **2,369** | **4,584** | **4,860** |
| Montana | 16,011 | 11,687 | 11,392 | 13,225 | 13,290 | 121 | 107 | 101 | 100 |
| Idaho | 11,330 | 7,639 | 8,113 | 10,180 | 10,620 | 202 | 252 | 458 | 480 |
| Wyoming | 2,962 | 1,523 | 1,690 | 2,017 | 2,100 | 112 | 149 | 180 | 210 |
| Colorado | 11,062 | 6,937 | 7,338 | 8,488 | 8,890 | 1,032 | 1,632 | 2,397 | 2,740 |
| New Mexico | 1,898 | 1,041 | 1,229 | 1,541 | 1,650 | 52 | 117 | 246 | 270 |
| Arizona | 559 | 412 | 530 | 513 | 590 | 25 | 23 | 70 | 70 |
| Utah | 2,421 | 1,442 | 1,442 | 1,748 | 1,800 | 134 | 196 | 186 | 200 |
| Nevada | 277 | 201 | 253 | 269 | 280 | 9 | 21 | 3 | 5 |
| **MOUNTAIN STATES** | **46,520** | **30,882** | **31,987** | **37,981** | **39,220** | **1,687** | **2,497** | **3,641** | **4,075** |
| Washington | 9,706 | 6,891 | 7,330 | 8,471 | 8,950 | 307 | 269 | 490 | 500 |
| Oregon | 8,372 | 5,107 | 5,266 | 6,442 | 6,600 | 167 | 106 | 185 | 170 |
| California | 8,366 | 5,619 | 5,373 | 6,492 | 6,500 | 633 | 696 | 1,085 | 1,130 |
| **PACIFIC** | **26,444** | **17,617** | **17,969** | **21,405** | **22,050** | **1,107** | **1,071** | **1,760** | **1,800** |
| **TOTAL** | **909,637** | **467,182** | **524,072** | **664,083** | **702,000** | **184,032** | **251,043** | **351,633** | **390,000** |

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[1] The Census in 1964 included self-propelled and pull types. The Census in 1969, 1974, 1978 and the estimated number for July 1, 1982 cover only self-propelled combines.
[2] The Census in 1969 included only corn heads on class 1-5 farms ($2,500 or more of income). The Census in 1974, 1978 and the estimated number for July 1, 1982 cover all farms.

# Principal Machines on Farms—1982

| STATE | PICK-UP BALERS | | | | | FIELD FORAGE HARVESTERS[1] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1964 Census Number | 1969 Census Number | 1974 Census Number | 1978 Census Number | Estimated July 1, 1982 Number | 1964 Census Number | 1969 Census Number | 1974 Census Number | 1978 Census Number | Estimated July 1, 1982 Number |
| Maine | 3,339 | 2,446 | 2,255 | 2,770 | 2,660 | 998 | 712 | 914 | 1,341 | 2,100 |
| New Hampshire | 1,681 | 1,266 | 1,197 | 1,448 | 1,420 | 747 | 385 | 612 | 553 | 710 |
| Vermont | 5,796 | 4,171 | 3,975 | 4,434 | 4,300 | 2,358 | 1,542 | 2,328 | 2,798 | 3,800 |
| Massachusetts | 2,343 | 1,774 | 1,600 | 1,900 | 1,800 | 1,412 | 744 | 923 | 1,185 | 1,600 |
| Rhode Island | 250 | 171 | 172 | 209 | 205 | 233 | 88 | 122 | 138 | 170 |
| Connecticut | 1,971 | 1,604 | 1,313 | 1,715 | 1,520 | 1,561 | 788 | 777 | 831 | 1,020 |
| New York | 38,107 | 31,074 | 27,495 | 30,762 | 28,800 | 20,710 | 13,815 | 17,363 | 20,891 | 27,600 |
| New Jersey | 3,073 | 2,357 | 2,066 | 2,458 | 2,230 | 2,181 | 1,171 | 1,127 | 1,255 | 1,450 |
| Pennsylvania | 41,873 | 35,571 | 32,195 | 38,745 | 36,900 | 20,794 | 12,240 | 15,485 | 19,187 | 28,000 |
| Delaware | 664 | 609 | 628 | 618 | 595 | 475 | 245 | 422 | 282 | 390 |
| Maryland | 6,845 | 5,750 | 5,159 | 6,083 | 5,740 | 3,961 | 2,177 | 2,603 | 2,943 | 4,350 |
| **NORTHEAST** | **105,942** | **86,793** | **78,055** | **91,142** | **86,170** | **55,430** | **33,907** | **42,676** | **51,404** | **71,190** |
| Ohio | 43,607 | 40,101 | 36,137 | 39,170 | 36,700 | 11,759 | 7,788 | 9,757 | 11,419 | 16,800 |
| Indiana | 25,459 | 23,414 | 21,705 | 24,655 | 23,400 | 7,523 | 5,344 | 6,121 | 6,912 | 9,750 |
| Illinois | 38,163 | 33,291 | 29,822 | 31,487 | 29,200 | 16,295 | 10,130 | 11,333 | 11,905 | 15,500 |
| Iowa | 60,111 | 55,456 | 47,461 | 47,729 | 42,900 | 20,937 | 14,245 | 17,179 | 19,479 | 26,500 |
| Missouri | 36,265 | 38,929 | 38,487 | 44,886 | 43,700 | 9,315 | 6,884 | 7,430 | 8,786 | 9,870 |
| **CORN BELT** | **203,605** | **191,191** | **173,612** | **187,927** | **175,900** | **65,829** | **44,391** | **51,820** | **58,501** | **78,420** |
| Michigan | 31,502 | 26,915 | 23,897 | 26,039 | 24,100 | 15,077 | 8,986 | 11,682 | 12,986 | 17,070 |
| Wisconsin | 63,921 | 56,939 | 54,962 | 59,847 | 58,300 | 48,149 | 27,199 | 38,341 | 43,574 | 60,800 |
| Minnesota | 55,896 | 51,600 | 46,689 | 50,534 | 47,400 | 26,024 | 17,761 | 20,825 | 23,437 | 29,700 |
| **LAKE STATES** | **151,319** | **135,454** | **125,548** | **136,420** | **129,800** | **89,250** | **53,946** | **70,848** | **79,997** | **107,570** |
| North Dakota | 15,823 | 15,623 | 14,831 | 15,380 | 14,670 | 9,555 | 6,614 | 5,911 | 5,539 | 5,800 |
| South Dakota | 14,441 | 14,657 | 13,835 | 14,258 | 13,500 | 10,810 | 9,755 | 11,254 | 11,364 | 12,100 |
| Nebraska | 19,907 | 18,988 | 17,309 | 17,160 | 15,900 | 13,268 | 11,232 | 12,632 | 13,935 | 15,960 |
| Kansas | 28,086 | 27,464 | 26,846 | 29,550 | 28,600 | 17,035 | 11,712 | 10,651 | 10,844 | 11,580 |
| **GREAT PLAINS** | **78,257** | **76,732** | **72,821** | **76,348** | **72,670** | **50,668** | **39,313** | **40,448** | **41,682** | **45,440** |
| West Virginia | 7,382 | 8,013 | 7,444 | 10,051 | 9,550 | 1,155 | 1,143 | 1,478 | 2,134 | 2,680 |
| Kentucky | 21,476 | 24,121 | 23,536 | 32,538 | 31,600 | 3,157 | 3,621 | 4,400 | 8,269 | 9,630 |
| Tennessee | 15,234 | 17,686 | 17,090 | 22,597 | 22,050 | 3,002 | 2,953 | 3,602 | 5,579 | 6,720 |
| Virginia | 16,105 | 16,035 | 15,285 | 19,222 | 18,530 | 4,450 | 4,181 | 4,675 | 6,343 | 7,380 |
| North Carolina | 10,322 | 10,053 | 10,115 | 12,591 | 12,400 | 3,365 | 2,695 | 3,841 | 4,317 | 5,120 |
| **APPALACHIAN** | **70,499** | **75,908** | **73,470** | **96,999** | **94,130** | **15,129** | **14,593** | **17,996** | **26,642** | **31,530** |
| South Carolina | 4,468 | 3,857 | 3,719 | 4,763 | 4,670 | 1,139 | 887 | 1,075 | 1,381 | 1,760 |
| Georgia | 6,917 | 7,118 | 6,678 | 8,909 | 8,700 | 1,696 | 1,455 | 1,722 | 2,652 | 3,440 |
| Florida | 1,419 | 1,692 | 1,910 | 2,885 | 2,800 | 543 | 447 | 629 | 916 | 1,400 |
| Alabama | 6,231 | 7,227 | 7,662 | 10,393 | 10,400 | 1,233 | 1,250 | 1,513 | 2,158 | 2,680 |
| **SOUTHEAST** | **19,035** | **19,894** | **19,969** | **26,950** | **26,570** | **4,611** | **4,039** | **4,939** | **7,107** | **9,280** |
| Mississippi | 6,618 | 7,045 | 7,431 | 8,752 | 8,680 | 1,697 | 1,531 | 2,130 | 2,168 | 2,550 |
| Louisiana | 5,064 | 4,831 | 4,594 | 6,192 | 5,940 | 775 | 763 | 872 | 1,872 | 2,650 |
| Arkansas | 6,456 | 7,500 | 8,040 | 11,022 | 10,800 | 1,181 | 1,014 | 1,047 | 1,882 | 2,180 |
| **DELTA STATES** | **18,138** | **19,376** | **20,065** | **25,966** | **25,420** | **3,653** | **3,308** | **4,049** | **5,922** | **7,380** |
| Oklahoma | 12,965 | 14,246 | 14,432 | 20,032 | 19,800 | 2,820 | 1,872 | 1,740 | 2,420 | 2,780 |
| Texas | 15,737 | 18,208 | 18,534 | 28,338 | 28,600 | 4,643 | 3,556 | 3,215 | 5,451 | 6,280 |
| **SOUTHERN PLAINS** | **28,702** | **32,454** | **32,966** | **48,370** | **48,400** | **7,463** | **5,428** | **4,955** | **7,871** | **9,060** |
| Montana | 11,458 | 11,059 | 10,613 | 11,857 | 11,450 | 1,736 | 1,695 | 1,512 | 2,130 | 2,450 |
| Idaho | 13,072 | 12,057 | 12,048 | 13,043 | 13,000 | 2,696 | 1,907 | 2,048 | 2,435 | 2,930 |
| Wyoming | 4,259 | 4,357 | 4,383 | 4,572 | 4,570 | 1,086 | 924 | 995 | 1,267 | 1,550 |
| Colorado | 9,600 | 9,504 | 9,505 | 10,564 | 10,670 | 5,252 | 3,744 | 3,755 | 4,418 | 5,180 |
| New Mexico | 2,340 | 2,532 | 2,833 | 3,427 | 3,540 | 560 | 490 | 591 | 786 | 1,000 |
| Arizona | 1,001 | 860 | 1,018 | 1,081 | 1,100 | 556 | 281 | 314 | 341 | 520 |
| Utah | 6,389 | 5,887 | 5,957 | 7,171 | 7,230 | 1,989 | 1,378 | 1,560 | 1,909 | 2,320 |
| Nevada | 1,264 | 1,177 | 1,299 | 1,524 | 1,540 | 291 | 189 | 233 | 367 | 510 |
| **MOUNTAIN STATES** | **49,383** | **47,433** | **47,656** | **53,239** | **53,100** | **14,166** | **10,608** | **11,008** | **13,653** | **16,460** |
| Washington | 9,759 | 8,658 | 8,215 | 9,327 | 9,250 | 3,734 | 1,837 | 2,234 | 3,019 | 5,280 |
| Oregon | 8,007 | 7,218 | 7,195 | 9,207 | 9,130 | 2,419 | 1,532 | 1,496 | 2,718 | 3,790 |
| California | 8,389 | 6,829 | 6,435 | 6,832 | 6,460 | 3,189 | 1,666 | 2,006 | 2,628 | 4,600 |
| **PACIFIC** | **26,155** | **22,705** | **21,845** | **25,366** | **24,840** | **9,342** | **5,035** | **5,736** | **8,365** | **13,670** |
| **TOTAL** | **751,035** | **707,940** | **666,007** | **768,727** | **737,000** | **315,541** | **214,568** | **254,475** | **301,144** | **390,000** |

[1] The Census in 1964 and the estimated number of July 1, 1982 include shear-bar and flail types. The Census in 1969, 1974 and 1978 covered only the number of shear-bar harvesters.

# Principal Machines on Farms — 1982

| STATE | POWER TRACTOR MOWERS (Cutter bar type only) Estimated July 1, 1968 Number | Estimated July 1, 1982 Number | SIDE DELIVERY RAKES Estimated July 1, 1968 Number | Estimated July 1, 1982 Number | MOWER CONDITIONERS[1] 1974 Census Number | 1978 Census Number | Estimated July 1, 1982 Number |
|---|---|---|---|---|---|---|---|
| Maine | 9,000 | 7,460 | 10,000 | 6,450 | 1,378 | 2,092 | 2,510 |
| New Hampshire | 4,400 | 3,400 | 5,000 | 2,740 | 605 | 1,029 | 1,210 |
| Vermont | 10,000 | 9,950 | 10,300 | 8,060 | 2,776 | 4,104 | 5,130 |
| Massachusetts | 5,800 | 4,430 | 6,000 | 3,860 | 1,048 | 1,568 | 1,840 |
| Rhode Island | 550 | 390 | 500 | 340 | 102 | 144 | 160 |
| Connecticut | 4,500 | 3,900 | 4,000 | 2,730 | 786 | 1,234 | 1,530 |
| New York | 55,000 | 61,800 | 61,000 | 50,900 | 18,701 | 26,674 | 32,800 |
| New Jersey | 7,000 | 5,020 | 8,000 | 4,380 | 1,636 | 2,518 | 2,580 |
| Pennsylvania | 60,000 | 68,500 | 67,000 | 53,800 | 20,428 | 30,551 | 34,800 |
| Delaware | 1,750 | 1,210 | 2,200 | 1,120 | 525 | 603 | 830 |
| Maryland | 14,000 | 12,640 | 13,000 | 9,900 | 3,614 | 4,944 | 5,670 |
| **NORTHEAST** | **172,000** | **178,700** | **187,000** | **144,280** | **51,599** | **75,461** | **89,060** |
| Ohio | 70,000 | 72,900 | 86,000 | 62,400 | 20,268 | 28,007 | 33,100 |
| Indiana | 64,000 | 57,200 | 71,000 | 45,900 | 12,503 | 16,162 | 20,350 |
| Illinois | 106,000 | 80,000 | 86,000 | 59,800 | 18,793 | 21,817 | 28,900 |
| Iowa | 115,000 | 118,700 | 127,000 | 100,100 | 19,636 | 26,631 | 33,800 |
| Missouri | 80,000 | 95,300 | 50,000 | 58,500 | 17,228 | 24,047 | 31,600 |
| **CORN BELT** | **435,000** | **424,100** | **420,000** | **326,700** | **88,428** | **116,664** | **147,750** |
| Michigan | 48,000 | 54,800 | 85,000 | 48,200 | 15,924 | 22,066 | 25,400 |
| Wisconsin | 93,000 | 117,500 | 115,000 | 100,500 | 36,232 | 52,723 | 65,300 |
| Minnesota | 96,000 | 109,200 | 108,000 | 97,500 | 22,979 | 32,101 | 37,600 |
| **LAKE STATES** | **237,000** | **281,500** | **308,000** | **246,200** | **75,135** | **106,890** | **128,300** |
| North Dakota | 42,000 | 45,600 | 26,000 | 25,700 | 5,971 | 6,395 | 8,430 |
| South Dakota | 44,000 | 53,000 | 31,000 | 26,000 | 4,445 | 5,715 | 6,240 |
| Nebraska | 61,000 | 63,900 | 41,000 | 39,900 | 9,225 | 15,128 | 15,130 |
| Kansas | 62,000 | 62,500 | 42,000 | 41,300 | 9,247 | 17,520 | 16,760 |
| **GREAT PLAINS** | **209,000** | **225,000** | **140,000** | **132,900** | **28,888** | **44,758** | **46,560** |
| West Virginia | 14,000 | 21,000 | 8,000 | 10,900 | 3,484 | 5,401 | 5,700 |
| Kentucky | 48,000 | 56,500 | 28,000 | 35,500 | 14,718 | 24,497 | 25,300 |
| Tennessee | 47,000 | 60,700 | 25,500 | 28,000 | 12,037 | 17,526 | 20,170 |
| Virginia | 28,000 | 37,300 | 25,500 | 27,400 | 8,714 | 13,099 | 15,300 |
| North Carolina | 27,000 | 36,500 | 15,000 | 18,100 | 6,824 | 10,767 | 11,060 |
| **APPALACHIAN** | **164,000** | **212,000** | **102,000** | **119,900** | **45,777** | **71,290** | **77,530** |
| South Carolina | 12,500 | 11,720 | 7,500 | 6,880 | 2,471 | 3,612 | 4,080 |
| Georgia | 23,000 | 21,900 | 12,000 | 12,170 | 6,383 | 9,451 | 9,900 |
| Florida | 7,500 | 4,400 | 2,200 | 2,200 | 4,000 | 7,114 | 5,940 |
| Alabama | 19,000 | 19,900 | 7,300 | 8,700 | 5,367 | 8,834 | 8,470 |
| **SOUTHEAST** | **62,000** | **57,920** | **29,000** | **29,950** | **18,221** | **29,011** | **28,390** |
| Mississippi | 21,000 | 25,500 | 5,000 | 11,400 | 5,282 | 8,041 | 8,220 |
| Louisiana | 12,000 | 12,900 | 6,000 | 7,140 | 4,421 | 7,396 | 6,400 |
| Arkansas | 24,000 | 24,530 | 12,000 | 12,070 | 5,521 | 8,653 | 10,150 |
| **DELTA STATES** | **57,000** | **62,930** | **23,000** | **30,610** | **15,224** | **24,090** | **24,770** |
| Oklahoma | 37,000 | 37,500 | 22,000 | 22,750 | 7,703 | 15,717 | 14,450 |
| Texas | 48,000 | 54,800 | 21,000 | 26,200 | 19,487 | 34,266 | 33,600 |
| **SOUTHERN PLAINS** | **85,000** | **92,300** | **43,000** | **48,950** | **27,190** | **49,983** | **48,050** |
| Montana | 23,000 | 25,100 | 15,000 | 15,940 | 3,205 | 7,513 | 4,850 |
| Idaho | 27,000 | 24,800 | 23,000 | 19,000 | 3,367 | 9,282 | 5,150 |
| Wyoming | 10,500 | 7,060 | 6,000 | 6,000 | 1,179 | 3,530 | 1,950 |
| Colorado | 24,000 | 18,600 | 25,000 | 17,000 | 2,712 | 7,449 | 4,260 |
| New Mexico | 8,000 | 5,470 | 8,000 | 4,880 | 1,005 | 2,451 | 1,470 |
| Arizona | 4,500 | 2,340 | 3,700 | 1,620 | 427 | 841 | 600 |
| Utah | 11,700 | 13,000 | 12,000 | 10,800 | 2,257 | 5,292 | 4,090 |
| Nevada | 2,300 | 1,830 | 2,300 | 1,740 | 384 | 1,286 | 540 |
| **MOUNTAIN STATES** | **111,000** | **98,200** | **95,000** | **76,980** | **14,536** | **37,644** | **22,910** |
| Washington | 27,000 | 25,000 | 16,000 | 15,550 | 4,218 | 8,536 | 6,580 |
| Oregon | 23,000 | 23,350 | 15,000 | 13,750 | 3,634 | 7,487 | 6,210 |
| California | 33,000 | 28,000 | 22,000 | 16,230 | 3,590 | 8,129 | 4,890 |
| **PACIFIC** | **83,000** | **76,350** | **53,000** | **45,530** | **11,442** | **24,152** | **17,680** |
| **TOTAL** | **1,615,000** | **1,709,000** | **1,400,000** | **1,202,000** | **376,440** | **579,943** | **631,000** |

[1] Does not include windrowers with conditioning rolls.

# Principal Machines on Farms – 1982

| STATE | POWER ELEVATORS Estimated July 1,1951 Number | POWER ELEVATORS Estimated July 1, 1958 Number | POWER ELEVATORS Estimated July 1, 1982 Number | Manure Spreaders Estimated July 1, 1982 Number | Corn and Cotton Planters Estimated July 1, 1982 Number | Grain Drills Estimated July 1, 1982 Number |
|---|---|---|---|---|---|---|
| Maine | 1,200 | 12,000 | 5,400 | 3,490 | 360 | 935 |
| New Hampshire | | | 2,550 | 2,170 | 315 | 70 |
| Vermont | | | 8,170 | 6,910 | 1,750 | 360 |
| Massachusetts | | | 3,670 | 2,560 | 970 | 130 |
| Rhode Island | | | 520 | 300 | 115 | 35 |
| Connecticut | | | 4,270 | 2,630 | 1,125 | 95 |
| New York | 7,200 | 35,000 | 71,100 | 44,200 | 21,600 | 29,300 |
| New Jersey | 2,000 | 5,500 | 6,260 | 2,680 | 2,625 | 2,670 |
| Pennsylvania | 9,600 | 38,000 | 75,700 | 46,000 | 36,600 | 44,300 |
| Delaware | 500 | 2,000 | 4,000 | 1,930 | 2,320 | 2,215 |
| Maryland | 2,500 | 7,500 | 16,650 | 9,320 | 9,440 | 9,800 |
| **NORTHEAST** | **23,000** | **100,000** | **198,290** | **122,190** | **77,220** | **89,910** |
| Ohio | 27,000 | 68,000 | 129,800 | 62,000 | 70,100 | 70,000 |
| Indiana | 30,000 | 66,000 | 128,900 | 55,400 | 71,800 | 56,800 |
| Illinois | 61,000 | 110,000 | 196,500 | 81,000 | 104,700 | 71,500 |
| Iowa | 80,000 | 122,000 | 206,300 | 110,500 | 116,600 | 66,700 |
| Missouri | 15,000 | 41,000 | 91,800 | 62,700 | 55,400 | 57,700 |
| **CORN BELT** | **213,000** | **407,000** | **753,300** | **371,600** | **418,600** | **322,700** |
| Michigan | 14,000 | 45,000 | 92,100 | 40,800 | 42,400 | 56,400 |
| Wisconsin | 15,000 | 48,000 | 145,100 | 93,000 | 74,600 | 71,600 |
| Minnesota | 46,000 | 90,000 | 162,300 | 85,200 | 89,900 | 83,100 |
| **LAKE STATES** | **75,000** | **183,000** | **399,500** | **219,000** | **206,900** | **211,100** |
| North Dakota | 28,000 | 45,000 | 78,700 | 23,000 | 16,900 | 65,900 |
| South Dakota | 24,000 | 40,000 | 70,000 | 32,100 | 34,000 | 37,200 |
| Nebraska | 36,000 | 60,000 | 108,400 | 49,500 | 50,400 | 47,800 |
| Kansas | 25,000 | 55,000 | 115,700 | 41,500 | 24,700 | 78,200 |
| **GREAT PLAINS** | **113,000** | **200,000** | **372,800** | **146,100** | **126,000** | **229,100** |
| West Virginia | 500 | 3,000 | 6,950 | 9,300 | 5,820 | 4,060 |
| Kentucky | 2,500 | 10,000 | 26,850 | 31,000 | 43,000 | 12,600 |
| Tennessee | 1,000 | 6,500 | 16,500 | 22,700 | 58,000 | 15,800 |
| Virginia | 2,000 | 11,000 | 20,800 | 24,200 | 29,200 | 19,200 |
| North Carolina | 1,000 | 7,500 | 22,450 | 23,400 | 81,900 | 25,600 |
| **APPALACHIAN** | **7,000** | **38,000** | **93,550** | **110,600** | **217,920** | **77,280** |
| South Carolina | 300 | 2,000 | 5,100 | 4,400 | 34,500 | 13,250 |
| Georgia | 900 | 6,000 | 15,250 | 7,400 | 43,500 | 11,370 |
| Florida | 300 | 1,500 | 4,050 | 1,300 | 6,660 | 1,980 |
| Alabama | 500 | 4,500 | 12,500 | 4,980 | 47,500 | 8,000 |
| **SOUTHEAST** | **2,000** | **14,000** | **36,900** | **18,080** | **132,160** | **34,600** |
| Mississippi | 700 | 4,500 | 8,550 | 5,630 | 59,200 | 9,420 |
| Louisiana | 400 | 1,000 | 2,800 | 3,230 | 22,170 | 8,450 |
| Arkansas | 900 | 4,500 | 10,450 | 7,900 | 24,300 | 15,150 |
| **DELTA STATES** | **2,000** | **10,000** | **21,800** | **16,760** | **105,670** | **33,020** |
| Oklahoma | 6,000 | 12,000 | 27,860 | 10,200 | 10,400 | 36,600 |
| Texas | 9,000 | 23,000 | 44,250 | 19,300 | 62,300 | 57,000 |
| **SOUTHERN PLAINS** | **15,000** | **35,000** | **72,110** | **29,500** | **72,700** | **93,600** |
| Montana | 7,500 | 17,500 | 30,900 | 12,000 | 1,230 | 24,570 |
| Idaho | 3,100 | 13,300 | 27,070 | 15,000 | 2,990 | 18,000 |
| Wyoming | 700 | 2,500 | 5,550 | 5,210 | 1,090 | 4,780 |
| Colorado | 7,000 | 13,000 | 27,780 | 15,400 | 7,020 | 18,000 |
| New Mexico | 500 | 1,500 | 2,860 | 2,520 | 3,560 | 2,250 |
| Arizona | 100 | 700 | 2,000 | 1,070 | 2,180 | 1,660 |
| Utah | 700 | 5,000 | 11,140 | 8,250 | 1,920 | 6,340 |
| Nevada | 400 | 500 | 1,050 | 1,220 | 70 | 380 |
| **MOUNTAIN STATES** | **20,000** | **54,000** | **108,350** | **60,670** | **20,060** | **75,980** |
| Washington | 2,000 | 8,000 | 24,050 | 16,000 | 2,080 | 14,550 |
| Oregon | 3,000 | 8,000 | 19,400 | 14,000 | 1,290 | 13,660 |
| California | 4,000 | 13,000 | 25,950 | 16,500 | 10,400 | 10,500 |
| **PACIFIC** | **9,000** | **29,000** | **69,400** | **46,500** | **13,770** | **38,710** |
| **TOTAL** | **479,000** | **1,070,000** | **2,126,000** | **1,141,000** | **1,391,000** | **1,206,000** |

# Principal Machines on Farms — 1982

|  | MOTOR TRUCKS |  |  |  |  |  |  | Internal Combustion Engines[2] | Chain Saws |
|---|---|---|---|---|---|---|---|---|---|
| STATE | 1954 Adj. Cen. 1,000's | 1959 Census 1,000's | 1964 Census 1,000's | 1969 Census 1,000's | 1974 Census 1,000's | 1978 Census 1,000's | Estimated July 1, 1982 1,000's | Estimated July 1, 1982 Number | Estimated July 1, 1982 Number |
| Maine | 18.1 | 17.3 | 14.8 | 12.1 | 11.3 | 13.5 | 13.6 | 1,820 | 8,640 |
| New Hampshire | 8.3 | 6.8 | 5.6 | 4.0 | 3.7 | 4.4 | 4.4 | 1,700 | 2,875 |
| Vermont | 11.1 | 10.0 | 8.1 | 6.1 | 6.2 | 7.9 | 8.0 | 2,400 | 7,140 |
| Massachusetts | 14.3 | 12.3 | 10.6 | 8.4 | 7.7 | 9.9 | 10.1 | 2,460 | 5,220 |
| Rhode Island | 1.9 | 1.9 | 1.8 | 1.2 | 1.2 | 1.5 | 1.5 | 250 | 730 |
| Connecticut | 13.2 | 11.0 | 9.9 | 7.4 | 6.2 | 7.5 | 7.6 | 2,150 | 4,375 |
| New York | 70.5 | 66.5 | 62.9 | 53.6 | 53.6 | 61.2 | 62.0 | 28,300 | 57,400 |
| New Jersey | 24,4 | 20.9 | 17.3 | 14.3 | 12.9 | 16.5 | 16.8 | 3,150 | 6,900 |
| Pennsylvania | 71.0 | 71.4 | 69.5 | 57.3 | 55.5 | 66.3 | 67.0 | 27,800 | 50,200 |
| Delaware | 5.2 | 5.3 | 5.2 | 5.1 | 5.7 | 6.5 | 6.6 | 1,260 | 2,900 |
| Maryland | 22.0 | 21.2 | 21.3 | 19.5 | 21.3 | 25.5 | 26.0 | 6,150 | 14,100 |
| **NORTHEAST** | **260.0** | **244.6** | **227.0** | **189.0** | **185.3** | **220.7** | **223.6** | **77,440** | **160,480** |
| Ohio | 77.0 | 81.5 | 91.4 | 93.7 | 97.8 | 112.9 | 114.4 | 26,500 | 69,900 |
| Indiana | 77.4 | 88.2 | 99.0 | 100.1 | 103.9 | 120.2 | 121.7 | 27,300 | 75,400 |
| Illinois | 99.9 | 113.7 | 120.9 | 129.3 | 139.9 | 155.4 | 157.5 | 40,400 | 81,800 |
| Iowa | 84.3 | 99.8 | 106.7 | 121.4 | 137.1 | 148.0 | 149.9 | 42,900 | 65,000 |
| Missouri | 95.8 | 109.7 | 123.0 | 132.5 | 134.0 | 162.5 | 164.7 | 43,800 | 108,650 |
| **CORN BELT** | **434.4** | **492.9** | **541.0** | **577.0** | **612.7** | **699.0** | **708.2** | **180,900** | **400,750** |
| Michigan | 70.5 | 75.7 | 80.5 | 74.6 | 73.6 | 83.4 | 84.5 | 24,300 | 52,400 |
| Wisconsin | 87.0 | 90.6 | 97.0 | 89.0 | 92.3 | 100.9 | 102.2 | 45,400 | 106,400 |
| Minnesota | 90.0 | 103.4 | 112.5 | 116.9 | 130.1 | 147.4 | 149.5 | 63,000 | 75,900 |
| **LAKE STATES** | **247.5** | **269.7** | **290.0** | **280.5** | **296.0** | **331.7** | **336.2** | **132,700** | **234,700** |
| North Dakota | 66.8 | 75.5 | 81.6 | 91.2 | 101.3 | 109.2 | 110.6 | 46,700 | 4,940 |
| South Dakota | 47.7 | 52.3 | 56.5 | 57.8 | 65.1 | 66.9 | 67.8 | 31,500 | 3,800 |
| Nebraska | 72.0 | 83.4 | 93.1 | 96.4 | 108.5 | 120.5 | 121.9 | 42,200 | 16,100 |
| Kansas | 112.1 | 122.3 | 134.0 | 141.3 | 150.9 | 164.4 | 166.7 | 55,500 | 26,700 |
| **GREAT PLAINS** | **298.6** | **333.5** | **365.2** | **386.7** | **425.8** | **461.0** | **467.0** | **175,900** | **51,540** |
| West Virginia | 26.0 | 24.7 | 24.1 | 19.5 | 16.9 | 21.8 | 22.0 | 6,600 | 24,800 |
| Kentucky | 66.7 | 74.9 | 90.5 | 97.1 | 95.8 | 125.4 | 127.0 | 21,700 | 51,250 |
| Tennessee | 71.6 | 76.8 | 86.3 | 92.8 | 88.1 | 104.6 | 105.9 | 16,400 | 67,700 |
| Virginia | 57.5 | 58.0 | 59.2 | 55.9 | 55.5 | 70.1 | 70.9 | 15,900 | 56,150 |
| North Carolina | 84.5 | 91.1 | 101.1 | 99.3 | 93.5 | 113.5 | 114.9 | 20,900 | 100,450 |
| **APPALACHIAN** | **306.3** | **325.5** | **361.2** | **364.6** | **349.8** | **435.4** | **440.7** | **81,500** | **300,350** |
| South Carolina | 39.2 | 39.1 | 39.0 | 35.3 | 33.7 | 40.5 | 40.9 | 8,200 | 28,370 |
| Georgia | 76.2 | 72.8 | 76.6 | 70.9 | 69.2 | 79.8 | 80.8 | 17,000 | 39,100 |
| Florida | 36.6 | 36.4 | 40.6 | 37.8 | 40.1 | 54.1 | 54.7 | 16,400 | 8,920 |
| Alabama | 63.7 | 63.4 | 69.5 | 67.4 | 64.4 | 75.1 | 76.0 | 13,900 | 36,800 |
| **SOUTHEAST** | **215.7** | **211.7** | **225.7** | **211.4** | **207.4** | **249.5** | **252.4** | **55,500** | **113,190** |
| Mississippi | 76.2 | 71.5 | 75.1 | 66.4 | 60.5 | 65.5 | 66.2 | 13,500 | 43,500 |
| Louisiana | 47.3 | 47.2 | 51.3 | 44.7 | 41.6 | 50.4 | 51.0 | 15,100 | 23,850 |
| Arkansas | 76.2 | 73.2 | 80.6 | 71.4 | 69.5 | 88.0 | 88.8 | 18,100 | 36,500 |
| **DELTA STATES** | **199.7** | **191.9** | **207.0** | **182.5** | **171.6** | **203.9** | **206.0** | **46,700** | **103,850** |
| Oklahoma | 85.7 | 92.7 | 105.1 | 106.8 | 101.6 | 126.2 | 127.5 | 27,400 | 11,820 |
| Texas | 187.8 | 197.8 | 211.0 | 227.6 | 208.1 | 257.3 | 257.9 | 79,600 | 23,060 |
| **SOUTHERN PLAINS** | **273.5** | **290.5** | **316.1** | **334.4** | **309.7** | **383.5** | **385.4** | **106,000** | **34,880** |
| Montana | 48.5 | 52.8 | 58.2 | 58.3 | 61.9 | 68.9 | 69.9 | 24,500 | 14,100 |
| Idaho | 38.7 | 44.0 | 48.3 | 47.1 | 51.4 | 59.2 | 60.0 | 20,200 | 15,630 |
| Wyoming | 15.0 | 16.2 | 17.7 | 18.4 | 19.2 | 20.6 | 21.0 | 8,070 | 3,810 |
| Colorado | 48.5 | 51.7 | 55.9 | 55.5 | 56.9 | 66.4 | 67.3 | 25,500 | 7,190 |
| New Mexico | 21.3 | 20.3 | 23.4 | 18.8 | 20.0 | 26.4 | 26.9 | 9,700 | 3,600 |
| Arizona | 13.5 | 16.8 | 17.2 | 12.1 | 14.4 | 16.8 | 17.1 | 6,480 | 610 |
| Utah | 18.0 | 18.8 | 20.3 | 18.3 | 19.4 | 22.7 | 23.1 | 8,310 | 2,850 |
| Nevada | 3.9 | 4.5 | 4.5 | 5.0 | 5.4 | 6.5 | 6.6 | 1,900 | 720 |
| **MOUNTAIN STATES** | **207.4** | **225.1** | **245.5** | **233.5** | **248.6** | **287.5** | **291.9** | **104,660** | **48,510** |
| Washington | 55.4 | 60.2 | 64.2 | 56.7 | 57.1 | 71.4 | 72.5 | 21,100 | 27,070 |
| Oregon | 47.7 | 48.9 | 53.6 | 46.2 | 49.6 | 60.8 | 61.6 | 27,200 | 30,680 |
| California | 128.8 | 131.0 | 126.1 | 115.7 | 118.8 | 142.7 | 144.5 | 80,400 | 38,000 |
| **PACIFIC** | **231.9** | **240.1** | **243.9** | **218.6** | **225.5** | **274.9** | **278.6** | **128,700** | **95,750** |
| **TOTAL** | **2,675.0** | **2,825.5** | **3,022.6** | **2,978.2** | **3,032.4** | **3,547.1** | **3,590.0** | **1,090,000** | **1,544,000** |

[1] Census numbers have been adjusted to bring them more in line with 1959 and later data based on the new definition of a farm.

[2] Includes engines used for stationary work such as irrigation, auxiliary engines on combines, balers, etc., and a small number of power units not elsewhere classified.

# NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-JUNE, 1982

**(Excludes garden tractors except as indicated in headings, footnotes.)**
**Number of units/Value in thousands of dollars**

| Nation of Origin | Under 20 HP* | 20-29 HP* | 30-39 HP* | 40-79 HP* | 80-99 HP* | 100 HP and Over* | HP Not Specifically Provided* |
|---|---|---|---|---|---|---|---|
| Canada | 1/$11 | 2/$16 | 16/$164 | 16/$332 | 48/$1,918 | 170/$7,683 | 913/$55,137 |
| United Kingdom | ..... | ..... | 8/109 | 1,084/12,458 | 409/6,048 | 63/1,148 | 46/586 |
| West Germany | ..... | ..... | 1/17 | 2,107/24,439 | 1,543/25,051 | 482/11,211 | 43/746 |
| Italy | ..... | 10/172 | 255/1,296 | 561/6,778 | 178/2,367 | 181/696 | ..... |
| Romania | ..... | 88/263 | 275/750 | 1,950/6,479 | ..... | ..... | ..... |
| Japan | 10,206/29,561 | 7,059/25,972 | 2,545/9,861 | 1,309/9,261 | 9/213 | 295/6,455 | 496/3,662 |
| Others*** | 7/18 | 6/22 | 1/7 | 242/3,726 | ..... | 28/799 | 6/90 |
| **TOTALS** | **10,214/$29,591** | **7,165/$26,445** | **3,101/$12,203** | **7,269/$63,473** | **2,187/$35,598** | **1,219/$27,992** | **1,504/$60,221** |

**Source:** U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods.
*Excluding garden tractors. **Including garden tractors. The term "industrial" here is understood to refer to such machines as forklifts, but not industrial tractors as defined in the farm and industrial equipment industry. ***Others include: Belgium (99), Czechoslovakia (69), Brazil (66), France (26), U.S.S.R. (3).

# NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-DEC., 1981

**(Excludes garden tractors except as indicated in headings, footnotes.)**
**Number of units/Value in thousands of dollars**

| Nation of Origin | Under 20 HP* | 20-29 HP* | 30-39 HP* | 40-79 HP* | 80-99 HP* | 100 HP and Over* | HP Not Specifically Provided* |
|---|---|---|---|---|---|---|---|
| Canada | 2/$2 | 8/$12 | 63/$588 | 47/$892 | 121/$4,151 | 461/$20,353 | 1,915/$116,940 |
| United Kingdom | 2/22 | 145/1,310 | 467/2,906 | 6,031/60,934 | 1,109/13,956 | 682/12,118 | 15/149 |
| West Germany | ..... | 1/2 | 1/8 | 6,653/67,422 | 2,421/33,125 | 750/15,337 | 7/125 |
| Italy | 134/111 | 10/36 | 632/3,670 | 1,839/16,977 | 430/6,793 | 341/6,550 | 57/511 |
| Romania | ..... | 112/208 | 446/1,143 | 3,050/10,536 | ..... | 1/6 | ..... |
| Japan | 23,016/69,925 | 12,964/47,920 | 4,998/20,015 | 2,281/14,139 | 3/23 | 85/293 | 714/3,302 |
| Belgium | ..... | ..... | ..... | 639/7,670 | ..... | ..... | ..... |
| Argentina | ..... | 1,071/6,427 | ..... | ..... | ..... | ..... | ..... |
| U.S.S.R. | ..... | ..... | 3/12 | 314/1,017 | ..... | ..... | ..... |
| Others*** | 54/123 | 28/103 | 51/396 | 102/3,047 | ..... | 19/1,059 | 6/160 |
| **TOTALS** | **23,208/$70,183** | **14,338/$56,020** | **6,661/$28,737** | **21,012/$182,835** | **4,084/$58,017** | **2,339/$55,718** | **2,714/$121,187** |

**Source:** U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods.
*Excluding garden tractors. **Including garden tractors. The term "industrial" here is understood to refer to such machines as forklifts, but not industrial tractors as defined in the farm and industrial equipment industry. ***Others include: Brazil (60), Korea (61), France (68), Poland (24), Netherlands (28), Czechoslovakia (40).

# NEW AGRICULTURAL WHEEL TRACTOR IMPORTS, JAN.-DEC., 1980

**(Excludes garden tractors except as indicated in headings, footnotes.)**
**Number of units/Value in thousands of dollars**

| Nation of Origin | Under 20 HP* | 20-29 HP* | 30-39 HP* | 40-79 HP* | 80-99 HP* | 100 HP and Over* | HP Not Specifically Provided* |
|---|---|---|---|---|---|---|---|
| Canada | 14/$47 | 12/$32 | 90/$626 | 244/$7,824 | 187/$6,096 | 755/$29,635 | 1,662/$89,530 |
| United Kingdom | 14/16 | 106/721 | 579/4,173 | 9,471/95,770 | 2,395/28,592 | 226/4,655 | 53/449 |
| Belgium | 7/56 | 12/89 | ..... | 220/10,142 | ..... | 2/7 | ..... |
| West Germany | 10/12 | 4/6 | 94/2,080 | 7,420/80,459 | 3,650/52,874 | 987/27,050 | 4/89 |
| Italy | 33/72 | 31/108 | 211/787 | 2,011/13,807 | 55/668 | 189/2,884 | 156/1,568 |
| Romania | ..... | 1,280/2,615 | 827/1,838 | 2,110/6,582 | ..... | ..... | 2/14 |
| Poland | ..... | ..... | 1/7 | 54/429 | 103/584 | 47/526 | ..... |
| U.S.S.R. | ..... | 1/2 | ..... | 455/1,422 | ..... | ..... | ..... |
| Japan | 16,917/42,213 | 15,897/54,470 | 7,622/35,193 | 2,120/15,661 | 5/36 | 2/31 | 80/469 |
| Others | ..... | 53/254 | 11/499 | 102/1,567 | 1/13 | 3/160 | 3/48 |
| **Totals** | **16,995/$42,415** | **17,396/$58,298** | **9,435/$45,202** | **24,757/$233,662** | **6,396/$89,063** | **2,211/$64,976** | **1,960/$92,167** |

**Source:** U.S. Dept. of Commerce, Industry & Trade Administration.
*Excluding garden tractors. **Including garden tractors. The term "industrial" here is understood to refer to such machines as fork-lifts, but not industrial tractor as defined in the farm and industrial equipment industry.

| Not Elsewhere Specified, Excl. Industrial, Incl, Garden Types, Rototillers** | Totals | |
|---|---|---|
| 91/$4,021 | 1,257/$69,282 | ..........Canada |
| 45/466 | 1,655/20,807 | ...United Kingdom |
| 20/423 | 4,205/61,887 | ....West Germany |
| 24/279 | 1,209/11,588 | ..............Italy |
| 14/94 | 2,327/7,586 | ..........Romania |
| 3,979/4,640 | 25,898/89,625 | ............Japan |
| 2/3 | 292/4,674 | .........Others*** |
| 4,184/$9,926 | 38,843/$269,449 | .......TOTALS |

| Not Elsewhere Specified, Excl. Industrial, Incl. Garden Types, Rototillers** | Totals | |
|---|---|---|
| 153/$6,007 | 2,770/$148,945 | ..........Canada |
| 93/973 | 8,544/92,368 | ...United Kingdom |
| 8/62 | 9,841/116,081 | ....West Germany |
| 116/1,684 | 3,559/36,304 | ..............Italy |
| 2/11 | 3,611/11,904 | ..........Romania |
| 5,469/9,024 | 49,330/164,641 | ............Japan |
| ..... | 639/7,870 | ..........Belgium |
| ..... | 1,071/6,427 | .........Argentina |
| 15/28 | 332/1,067 | ...........U.S.S.R. |
| 2/63 | 262/4,951 | .........Others*** |
| 5,858/$17,852 | 80,215/$590,549 | .......TOTALS |

| ot Elsewhere Specified, Ex- ding Industrial, cluding Garden Types** | Totals | |
|---|---|---|
| 194/$3,172 | 3,158/$136,967 | ..........Canada |
| 94/209 | 12,938/134,585 | ...United Kingdom |
| ..... | 789/10,204 | ..........Belgium |
| 207/3,606 | 12,379/166,187 | ....West Germany |
| 571/5,890 | 3,070/25,984 | ..............Italy |
| 33/153 | 4,252/11,202 | ..........Romania |
| 1/66 | 206/1,612 | ...........Poland |
| 26/33 | 465/1,457 | ...........U.S.S.R. |
| 8,600/5,529 | 51,243/153,802 | ............Japan |
| 119/557 | 292/3,118 | ............Others |
| 9,847/$19,236 | 88,997/$844,972 | ..........Totals |

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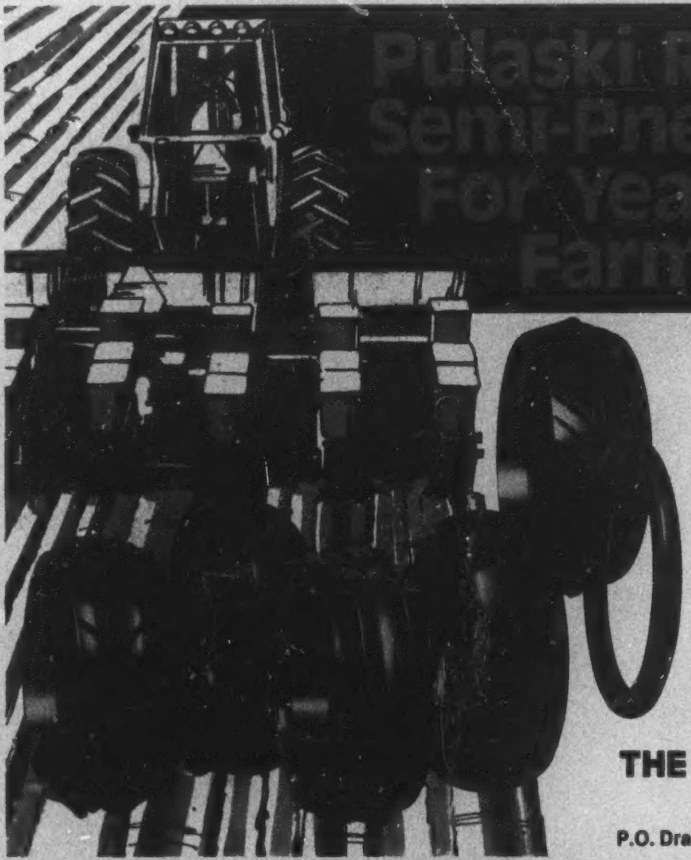
### DOLLAR VALUE OF FARM EQUIPMENT IMPORTS BY COUNTRY OF ORIGIN, Jan., 1977-June, 1982
(in thousands)

| Country | Jan.-Dec. 1977 | Jan.-Dec. 1978 | Jan.-Dec. 1979 | Jan.-Dec. 1980 | Jan.-Dec. 1981 | Jan.-June 1982 |
|---|---|---|---|---|---|---|
| Canada | $619,662 | $506,728 | $831,155 | $820,500 | $706,276 | $298,908 |
| Mexico | 8,363 | 6,277 | 10,082 | 9,080 | 9,699 | 4,674 |
| Brazil | NA* | 2,194 | 892 | 1,002 | 1,064 | 2,737 |
| Sweden | 2,077 | 1,708 | 4,818 | 4,456 | 2,784 | 2,013 |
| Norway | 1,751 | 1,075 | 1,273 | 1,239 | 1,615 | 583 |
| Denmark | 4,054 | 4,513 | 7,158 | 5,703 | 4,690 | 3,470 |
| Netherlands | 13,560 | 12,690 | 16,942 | 15,407 | 13,626 | 9,226 |
| United Kingdom | 110,071 | 125,241 | 209,967 | 215,932 | 153,589 | 51,379 |
| Belgium | 78,191 | 66,347 | 93,709 | 67,188 | 50,393 | 19,407 |
| France | 36,715 | 36,351 | 62,294 | 51,488 | 41,695 | 18,140 |
| West Germany | 118,861 | 141,392 | 231,521 | 236,578 | 197,110 | 97,260 |
| Austria | 1,219 | 783 | 1,188 | 1,195 | 1,328 | 514 |
| Hungary | 4,474 | 4,673 | 10,727 | 10,155 | 9,329 | 4,752 |
| U.S.S.R. | 1,415 | 1,113 | 2,715 | 1,716 | 1,296 | 68 |
| Poland | 3,705 | 1,746 | 1,346 | 3,334 | 1,715 | 442 |
| Romania | 10,451 | 8,372 | 11,648 | 11,611 | 12,598 | 8,155 |
| Italy | 50,246 | 75,066 | 78,523 | 94,794 | 100,853 | 45,032 |
| Spain | 4,326 | 3,768 | 9,239 | 5,559 | 3,561 | 4,927 |
| Israel | 940 | 1,545 | 2,616 | 3,218 | 2,777 | 1,960 |
| New Zealand | 2,525 | 1,918 | 5,312 | 6,665 | 8,630 | 4,418 |
| Australia | 3,642 | 3,218 | 5,937 | 4,366 | 7,306 | 2,351 |
| Japan | 73,861 | 167,858 | 267,599 | 189,753 | 202,000 | 100,763 |
| China (Taiwan) | 1,273 | 1,446 | 1,916 | 1,573 | 2,562 | 1,613 |
| South Africa | 3,830 | 3,972 | 6,332 | 5,234 | 2,409 | 119 |
| Others | 2,347 | 2,762 | 5,561 | 5,287 | 10,894 | 13,500 |
| **TOTAL** | $1,157,560 | $1,182,758 | $1,880,470 | $1,773,033 | $1,549,799 | $685,611 |

**Source:** U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods. *Data not available, included with "others."



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# IMPORTS OF FARM EQUIPMENT BY PRODUCT

| Product | Jan.-Dec., 1980<br>Quantity | Jan.-Dec., 1980<br>Value in Thousands of Dollars | Jan.-Dec., 1981<br>Quantity | Jan.-Dec., 1981<br>Value in Thousands of Dollars | Jan.-June, 1982<br>Quantity | Jan.-June, 1982<br>Value in Thousands of Dollars |
|---|---|---|---|---|---|---|
| Knives & Cutting Blades | 10,326,000 | $ 12,406 | 7,184,967 | $10,022 | 4,150,861 | $ 6,539 |
| Plows & Listers | 9,351 | 13,297 | 5,385 | 9,361 | 1,526 | 3,477 |
| Cultivators & Weeders | 16,854 | 27,760 | 10,190 | 25,274 | 8,984 | 12,346 |
| Parts of Plows, Cultivators, Weeders & Listers | ..... | 27,516 | ..... | 28,114 | ..... | 12,971 |
| Harrows, Rollers, Stalk Cutters, Soil Pulverizers | 23,030 | 10,102 | 21,615 | 10,794 | 14,948 | 5,003 |
| Parts of Harrows, Rollers, Stalk Cutters, etc. | ..... | 14,882 | ..... | 11,965 | ..... | 7,834 |
| Planting, Seeding & Fertilizing Machinery | 31,476 | 55,647 | 31,764 | 54,212 | 14,858 | 26,375 |
| Parts of Planting, Seeding & Fertilizing Machinery | ..... | 12,957 | ..... | 12,642 | ..... | 5,943 |
| Haying Machinery other than Mowers | 9,183 | 24,751 | 5,847 | 13,061 | 5,852 | 8,776 |
| Mowers except Lawn Mowers | 17,912 | 25,802 | 14,895 | 24,523 | 10,361 | 17,527 |
| Harvesting Machines, NES | 17,667 | 283,829 | 14,647 | 196,569 | 6,313 | 75,095 |
| Parts of Harvesting Machines | ..... | 95,307 | ..... | 65,224 | ..... | 32,498 |
| Farm Wagons & Carts | 10,829 | 11,733 | 9,963 | 13,010 | 2,903 | 5,110 |
| Agricultural Machines & Implements, NES | ..... | 85,859 | ..... | 94,045 | ..... | 37,807 |
| Parts of Agricultural Machines, NES | ..... | 67,386 | ..... | 67,308 | ..... | 29,150 |
| Tractors, Agricultural, Wheel-Type, New, excluding Industrial* | 88,997 | 644,972 | 80,215 | 590,549 | 36,843 | 265,449 |
| Tractors, Agri., Used | 3,040 | 19,013 | 3,176 | 20,551 | 1,746 | 12,823 |
| Parts for Agri. Tractors | ..... | 335,542 | ..... | 296,988 | ..... | 116,477 |

**Source:** U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods.

NES—Not elsewhere specified.

*Use of the term "Industrial" here is understood to refer to such machines as forklifts but not to industrial tractors as commonly defined in the farm and industrial equipment industry.

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# VALUE OF U.S. FARM EQUIPMENT EXPORTS BY COUNTRIES OF DESTINATION

(Value in thousands of dollars)

| Country | 1980 | 1981 | Jan.-June 1982 |
|---|---|---|---|
| **Western Hemisphere** | | | |
| Canada | $1,068,234 | $1,377,947 | $ 614,526 |
| Mexico | 350,572 | 259,970 | 96,601 |
| Guatemala | 7,020 | 6,498 | 1,839 |
| Honduras | 6,573 | 5,822 | 1,564 |
| Nicaragua | 18,116 | 10,014 | 2,284 |
| Costa Rica | 7,875 | 3,375 | 736 |
| Panama | 4,917 | 7,906 | 3,697 |
| Trinidad | 4,507 | 5,362 | 3,637 |
| Dominican Republic | 15,018 | 7,540 | 2,144 |
| Colombia | 17,290 | 18,755 | 8,035 |
| Jamaica | 2,105 | 3,703 | 2,820 |
| Venezuela | 68,581 | 76,691 | 29,428 |
| Brazil | 36,697 | 30,805 | 11,080 |
| Uruguay | 6,323 | 3,200 | 605 |
| Paraguay | 3,432 | 3,344 | 928 |
| Argentina | 41,687 | 27,807 | 6,196 |
| Chile | 12,425 | 11,893 | 2,022 |
| Ecuador | 13,017 | 16,163 | 7,049 |
| Peru | 14,793 | 11,686 | 3,944 |
| **Europe** | | | |
| Denmark | 11,852 | 5,729 | 2,748 |
| Sweden | 9,739 | 10,028 | 5,892 |
| United Kingdom | 66,143 | 77,137 | 40,535 |
| Netherlands | 11,494 | 10,375 | 7,042 |
| Belgium | 84,389 | 106,337 | 41,246 |
| France | 111,678 | 96,216 | 70,366 |
| West Germany | 78,472 | 60,724 | 47,951 |
| Hungary | 11,455 | 11,806 | 3,246 |
| Switzerland | 3,985 | 4,762 | 2,753 |
| Spain | 20,382 | 11,041 | 3,807 |
| Italy | 15,235 | 13,065 | 5,223 |
| Greece | 5,013 | 4,320 | 954 |
| Yugoslavia | 7,360 | 2,088 | 1,913 |
| U.S.S.R. | 10,276 | 36,506 | 12,913 |
| **Middle East** | | | |
| Iraq | 7,940 | 8,055 | 5,638 |
| Israel | 14,181 | 15,248 | 10,252 |
| Kuwait | 4,622 | 3,731 | 1,223 |
| Saudi Arabia | 28,564 | 63,813 | 29,558 |
| Syria | 2,673 | 2,293 | 561 |
| Arab Emirates | 2,536 | 6,722 | 2,651 |
| **Asia and Pacific** | | | |
| India | 3,865 | 2,791 | 730 |
| Thailand | 3,509 | 3,112 | 1,049 |
| Singapore | 24,790 | 19,919 | 7,370 |
| China (PRC) | 11,672 | 2,775 | 803 |
| China (Taiwan) | 2,769 | 2,864 | 1,215 |
| Malaysia | 3,158 | 3,331 | 1,132 |
| Indonesia | 4,015 | 2,455 | 1,047 |
| Philippines | 4,654 | 5,241 | 2,350 |
| Japan | 33,284 | 21,876 | 11,948 |
| Australia | 183,083 | 199,503 | 136,897 |
| New Zealand | 11,711 | 8,850 | 3,226 |
| **Africa** | | | |
| Algeria | 2,205 | 6,200 | 2,742 |
| Libya | 7,233 | 16,025 | 1,811 |
| Sudan | 5,974 | 5,974 | 13,417 |
| Nigeria | 8,534 | 10,633 | 4,784 |
| Egypt | 5,234 | 26,996 | 4,981 |
| Rep. South Africa | 47,928 | 94,929 | 40,479 |
| **Total U.S. Exports, Farm & Industrial Equipment** | **$2,631,287** | **$2,942,117** | **$1,360,948** |

Source: U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods.

tool tips

Snap-on. new tool

PGS1 AIR POWERED SCRAPER

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585

Circle (28) on Reply Card

## FARM EQUIPMENT EXPORTS BY TYPE OF PRODUCT

| Product | Jan.-Dec., 1980 Quantity | Jan.-Dec., 1980 Dollar Value in Thousands | Jan.-Dec., 1981 Quantity | Jan.-Dec., 1981 Dollar Value in Thousands | Jan.-June, 1982 Quantity | Jan.-June, 1982 Dollar Value in Thousands |
|---|---|---|---|---|---|---|
| Combines, pull-type | 2,238 | 45,807 | 2,061 | 43,402 | 1,571 | 40,261 |
| Combines, self-propelled | 7,085 | 205,525 | 6,936 | 252,609 | 4,382 | 160,538 |
| Cultivators, tractor-drawn or mounted | 7,753 | 13,342 | 8,780 | 15,490 | 3,193 | 7,055 |
| Cultivators, NEC, and Weeders | 4,628 | 5,193 | 3,277 | 5,467 | 1,533 | 2,356 |
| Farm Elevators and Blowers | 3,246 | 9,579 | 3,323 | 12,295 | 865 | 2,996 |
| Farm Wagons and Carts | 2,855 | 3,428 | 3,208 | 6,001 | 924 | 1,790 |
| Parts for Farm Wagons and Carts | ..... | 1,471 | ..... | 2,014 | ..... | 651 |
| Fertilizing Machines | 29,463 | 20,890 | 8,096 | 20,814 | 2,818 | 8,258 |
| Forage Harvesters | 6,146 | 38,960 | 3,806 | 30,155 | 1,818 | 23,106 |
| Harrows, Disk | 7,484 | 23,762 | 9,851 | 26,568 | 3,463 | 13,568 |
| Harrows, NEC, & Soil Pulverizers | 9,530 | 9,997 | 9,043 | 10,557 | 3,792 | 5,077 |
| Parts for Harrows, Stalk Cutters & Soil Pulverizers | ..... | 10,231 | ..... | 9,875 | ..... | 6,070 |
| Harvesting Machines, NEC | 12,860 | 116,973 | 10,474 | 110,879 | 4,483 | 38,398 |
| Harvesting Machine Parts | ..... | 83,228 | ..... | 151,325 | ..... | 76,314 |
| Hay Balers | 15,643 | 75,316 | 14,654 | 85,244 | 5,580 | 35,607 |
| Haying Machines, NEC (incl. rakes & tedders) | 7,555 | 36,214 | 9,087 | 44,660 | 3,332 | 21,333 |
| Parts for Haying Machines | ..... | 27,802 | ..... | 24,837 | ..... | 13,748 |
| Mowers, Cutterbar, tractor-drawn | 3,032 | 6,791 | 3,232 | 7,838 | 1,624 | 4,336 |
| Mowers, Rotary, tractor-drawn (excl. lawn mowers) | 10,884 | 9,309 | 8,826 | 6,861 | 6,829 | 5,085 |
| Mowers, NEC, tractor-drawn (excl. lawn mowers) | 3,150 | 9,032 | 3,598 | 11,128 | 998 | 2,760 |
| Planting Machines | 6,355 | 11,897 | 9,028 | 22,606 | 4,189 | 9,731 |
| Plows, Disk | 3,555 | 7,405 | 3,960 | 9,384 | 1,517 | 3,511 |
| Plows, Moldboard | 4,067 | 12,584 | 6,140 | 17,577 | 1,467 | 4,723 |
| Plows & Listers, NEC | 8,009 | 12,854 | 5,259 | 15,160 | 3,903 | 9,377 |
| Parts for Plows, Listers, Cultivators & Weeders | ..... | 31,325 | ..... | 35,876 | ..... | 15,502 |
| Seeding Machines | 14,461 | 21,248 | 16,604 | 30,111 | 8,134 | 16,493 |
| Parts for Planting, Seeding & Fertilizing Machines | ..... | 19,312 | ..... | 19,939 | ..... | 10,463 |
| Farm Tractors: | | | | | | |
| Under 40 PTO HP | 3,871 | 18,026 | 2,089 | 13,822 | 666 | 3,799 |
| 40-59 PTO HP | 1,401 | 13,895 | 1,784 | 21,320 | 415 | 4,907 |
| 60-79 PTO HP | 1,533 | 20,000 | 1,376 | 20,650 | 615 | 10,590 |
| 80-99 PTO HP | 1,395 | 24,638 | 1,984 | 37,231 | 598 | 13,896 |
| 100-119 PTO HP | 3,685 | 79,841 | 4,355 | 105,804 | 1,385 | 37,430 |
| 120-139 PTO HP | 7,039 | 168,898 | 7,057 | 188,020 | 2,693 | 76,465 |
| 140-159 PTO HP | 2,546 | 69,351 | 2,449 | 75,793 | 1,042 | 33,467 |
| 160-179 PTO HP | 1,437 | 51,786 | 1,914 | 74,218 | 560 | 25,458 |
| 180 HP & Over | 3,153 | 128,483 | 3,741 | 179,283 | 1,847 | 101,424 |
| Other Farm Tractors | 2,972 | 54,124 | 2,817 | 54,716 | 759 | 10,771 |
| Parts for Farm Tractors | ..... | 773,515 | ..... | 778,425 | ..... | 358,338 |

**Source:** U.S. Dept. of Commerce, Bureau of Industrial Economics, Office of Producer Goods.
NEC—Not elsewhere counted or classified.

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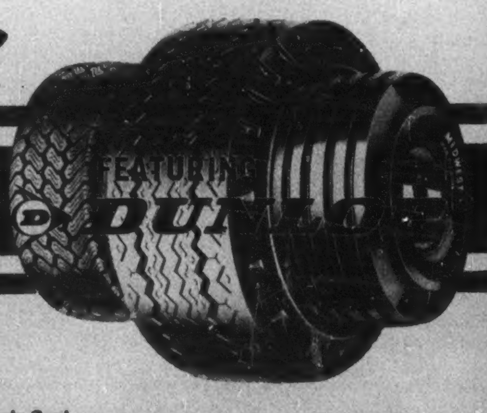


Circle (29) on Reply Card

## *Wheel Tractors, Attachments and Parts, Value of Shipments, 1977-1981*

(In thousands of dollars)

| | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Wheel Tractors, Farm Type | 3,066,418 | 2,761,480 | 2,901,693 | 2,264,398 | 2,424,139 |
| Wheel Tractors, Non-Farm | 97,257 | 115,154 | 165,506 | 132,694 | 115,458 |
| Attachments for Wheel Tractors, Farm and Non-Farm | 44,965 | 48,066 | 69,353 | 36,527 | 34,780 |
| Parts for Wheel Tractors, Farm and Non-Farm | 421,320 | 469,505 | 255,726 | 263,312 | 420,273 |
| Wheel Tractor Chassis, Shipped as Part of Shovel Loader/Backhoe | 315,639 | 306,736 | 351,306 | 278,269 | 212,826 |
| **TOTALS** | **3,945,599** | **3,700,941** | **3,743,584** | **2,975,200** | **3,207,476** |

Source: U.S. Dept. of Commerce, Bureau of the Census, Current Industrial Reports, Tractors (M35S).

## *Farm Machinery and Garden Equipment, Attachments and Parts, Value of Shipments, 1977-1981*

(in thousands of dollars)

| | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Planting, Seeding and Fertilizing Machinery | 770,264 | 680,743 | 652,944 | 522,416 | 550,782 |
| Harrows, Rollers, Pulverizers, Stalk Cutters | 523,735 | 555,377 | 601,262 | 462,419 | 465,974 |
| Plows | 234,009 | 245,875 | 273,496 | 203,617 | 239,151 |
| Harvesting Machinery | 2,578,812 | 2,207,075 | 2,133,516 | 1,815,631 | 1,599,722 |
| Haying Machinery | 715,441 | 778,199 | 674,621 | 533,738 | 469,715 |
| Farm Dairy Machines and Equipment | 159,961 | 143,372 | 134,301 | 108,920 | 97,347 |
| Sprayers and Dusters | 248,855 | 254,083 | 245,368 | 197,931 | 161,709 |
| Farm Elevators and Blowers | 117,761 | 140,809 | 173,492 | 157,168 | 1114,691 |
| Cultivators and Weeders | 239,985 | 275,793 | 275,519 | 206,125 | 140,079 |
| Machines for Preparing Crops for Market or Use | 312,061 | 340,083 | 384,916 | 356,008 | 308,932 |
| Farm Poultry Equipment | 144,940 | 174,931 | 223,333 | 159,452 | 127,867 |
| Hog Equipment | 42,354 | 63,951 | 120,728 | 95,226 | 54,481 |
| Other Barn and Barnyard Equipment | 256,629 | 274,220 | 306,942 | 251,587 | 188,150 |
| Garden Tractors, Motor Tillers | NA | NA | NA | 686,375 | 574,702 |
| Farm Wagons, Other Farm Transportation Equipment[1] | 198,650 | 207,105 | 276,557 | 247,779 | 183,934 |
| Irrigation Systems | 352,301 | 308,974 | 234,412 | 161,348 | 279,272 |
| Commercial Turf, Mowing Equipment | 188,587 | 200,666 | 119,189 | NA | 107,400* |
| Other Turf, Grounds Care Equipment | 37,299 | 35,430 | 33,008 | NA | 172,900* |
| Consumer Nonriding Lawn, Garden, Snow Equipment | 1,170,281 | 1,374,557 | 1,444,126 | NA | 844,400* |
| Consumer Riding Lawn, Garden, Snow Equipment | 903,922 | 953,403 | 1,047,080 | NA | 776,700* |
| **TOTALS** | **9,195,847** | **9,215,006** | **9,354,810** | **5,479,495** | **6,773,261** |

[1] Data for 1977 and 1978 include operator cabs in attachments and parts for these items.

NA—Not available or not applicable.

*Data from 1977 Census of Manufacturers.

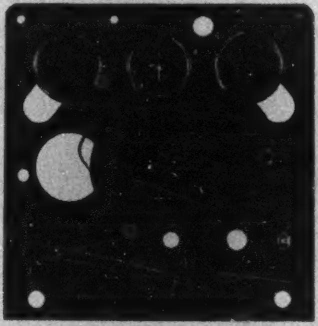
Source: U.S. Dept. of Commerce, Bureau of the Census, Current Industrial Reports, Farm Machinery and Lawn and Garden Equipment (MA-35A).

## *Shipments of Farm Machines and Equipment*

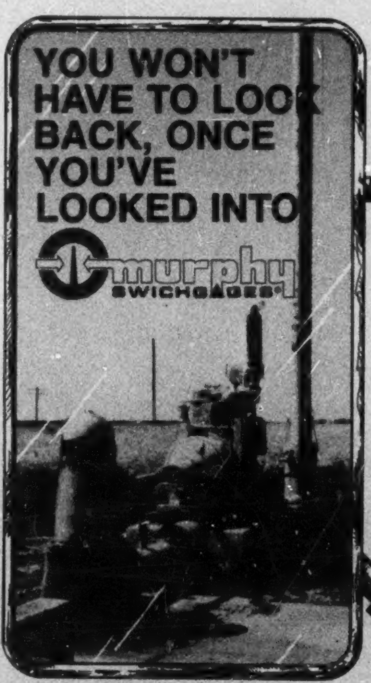
**(In units, 1977-1981)**

| Type of Farm Equipment | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Balers, hay (all types): | | | | | |
| Bales under 200 lbs. | 15,936 | 17,065 | 20,867 | 22,659 | 24,876 |
| Bales over 200 lbs. | 23,213 | 32,446 | 31,443 | 21,323 | 17,745 |
| Blowers (includes forage type, combination grain-forage type) | 6,771 | 9,752 | 11,526 | 12,018 | 10,348 |
| Cabs (metal), farm tractor | 8,292 | 10,565 | 49,259 | 54,651 | 6,766 |
| Cabs, other equipment | 3,193 | 4,051 | 4,648 | 3,995 | 9,025 |
| Combines, grain, pull-type and self-propelled | 32,062 | 28,502 | 32,400 | 32,020 | 31,943 |
| Combines, peanut | 270 | 880 | 1,632 | 1,974 | 1,790 |
| Corn heads | 17,107 | 14,601 | 20,052 | 18,629 | 24,035 |
| Cotton strippers (all types) | NA | 2,566 | 1,279 | 1,900 | 1,816 |
| Cultivators, corn and cotton types[1] | 21,697* | 28,726* | 37,939 | 38,355 | 33,999 |
| Cultivators, field: | | | | | |
| Pull-type | 10,613 | 14,897 | 19,520 | 13,440 | 17,470 |
| Mounted | 3,039 | 5,257 | 4,731 | 5,262 | 8,992 |
| Cultivators, rotary: | | | | | |
| Ground driven, sections and machines[2] | 14,545 | 20,355 | 16,480 | 16,794 | 16,219 |
| Ground driven, integrally mounted | | | 11,466 | 12,214 | 8,637 |
| Power driven | 456 | 486 | 700 | 628 | 672 |
| Cultivators and weeders, other | 30,936 | 47,727 | 39,153 | 42,148 | 46,372 |
| Cutters and shredders or rotary mowers (pto): | | | | | |
| Flail-type | 13,577 | 12,149 | 12,747 | 9,521 | 12,409 |
| Horizontal blade-type | 66,980 | 75,677 | 95,045 | 72,469 | 79,953 |

See footnotes at end of table.



**MURPHY 20-WHB ENGINE PANEL**



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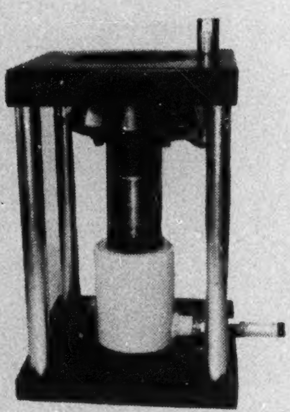
| Type of Farm Equipment | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Diggers, peanut (shakers and windrowers but not combines) | 685 | 1,233 | 1,847 | 2,002 | 2,517 |
| Distributors (fertilizer): | | | | | |
| Dry | 5,992 | 6,254 | 11,754 | 11,522 | 11,446 |
| Liquid | 10,035 | 10,070 | 7,196 | 6,503 | 6,619 |
| Anhydrous Ammonia | 6,103 | 6,693 | 7,178 | 6,455 | 6,562 |
| Dryers, grain, hay and seed batch type, pto or electric-motor operated | 5,413 | 7,899 | 9,809 | 9,355 | 10,373 |
| Continuous flow-type | 1,342 | 1,419 | 1,755 | 2,306 | 4,362 |
| Heated air units | 13,516 | 14,983 | 21,573 | 28,290 | 26,692 |
| Dusters, power, all types | 859 | 794 | 727 | 574 | 875 |
| Elevators, portable: | | | | | |
| Single chain | 5,507 | 7,316 | 8,224 | 7,211 | 5,004 |
| Double chain | 3,041 | 6,680 | 9,446 | 8,787 | 7,174 |
| Auger-type, under 6-in. dia. | 17,607 | 25,725 | 35,585 | 31,662 | 40,668 |
| Auger-type, 6-in. dia. | 18,144 | 27,885 | 56,809 | 79,401 | 73,628 |
| Auger-type, over 6-in. dia. | 18,825 | 23,809 | 59,658 | 81,664 | 58,382 |
| Elevators, stationary and other | 18,287 | 33,268 | 38,734 | 32,355 | 10,270 |
| Fans, crop drying and aeration | 27,422 | 26,162 | 51,441 | 59,912 | 45,668 |
| Grain drills, fixed-frame, all types | 19,911 | 19,448 | NA | NA | NA |
| Grain heads for combines | 48,694 | 46,162 | 50,177 | 50,609 | 45,892 |
| Grinder-mixers, stationary and portable | 8,031 | 14,152 | 18,888 | 16,907 | 12,393 |
| Harrows, disk | 51,704 | 67,676 | 85,375 | 76,857 | 96,650 |
| Harrow sections (spike-, spring-, and tine-tooth) | 76,096** | 96,893 | 120,695 | 98,108 | 103,260 |
| Harvesters, beet | 294 | 246 | 111 | 312 | 556 |

See footnotes at end of table.

*(More...)*



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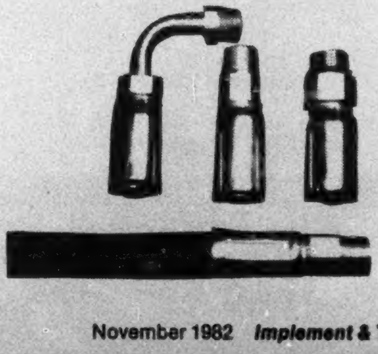

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## Shipments *(continued)*

| Type of Farm Equipment | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Harvesters, forage, field, shear-bar type, self-propelled and pull | 7,309 | 12,761 | 14,006 | 12,969 | 14,573 |
| Attachments for shear-bar type, pickup and cutter-bar hay units | 5,818 | 9,785 | 10,398 | 10,946 | 9,126 |
| Row crop units, all sizes | 6,857 | 11,800 | 13,578 | 13,532 | 14,687 |
| Flail-type, including discharge spouts | 2,254 | 3,062 | 3,080 | 3,972 | 4,167 |
| Harvesters, potato | 389 | 258 | 362 | 758 | 1,005 |
| Harvesting machinery, other | 7,837*** | 8,108 | 11,972 | 13,566 | 11,801 |
| Levelers or scrapers | 6,122 | 6,931 | 165,346 | 160,526 | 99,287 |
| Loaders, field, for baled hay | 2,874 | 6,457 | 6,890 | 6,160 | 4,136 |
| Loaders, tractor mounted, farm | 23,322 | 36,547 | 69,294 | 42,582 | 27,661 |
| Mills, feed, farm size (includes grinders and crushers of the hammer, burr or roller types | 6,662 | 8,035 | 11,077 | 10,614 | 6,508 |
| Mixers, feed, farm size | 3,094 | 3,162 | 4,108 | 3,578 | 2,885 |
| Mowers, cutter bar-type | 7,687 | 8,586 | 8,435 | 12,134 | 13,962 |
| Mower-conditioners, self-propelled and pull-type | 31,059 | 38,071 | 35,039 | 29,921 | 27,517 |
| Planters, corn and cotton, all types | 163,096 | 156,482 | NA | NA | 183,089 |
| Planters, row crop units (quantity in number of rows) | | | 36,887 | 37,764 | 41,424 |
| Plows, chisel or sweep type: | | | | | |
| Pull-type | 10,229 | 14,313 | 15,455 | 12,090 | 15,084 |
| Mounted | 5,321 | 6,094 | 9,703 | 10,501 | 15,194 |
| Plows, disk-chisel combination | 2,462 | 3,195 | NA | NA | NA |

See footnotes at end of table.

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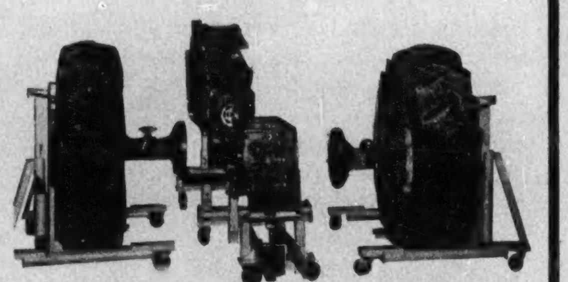

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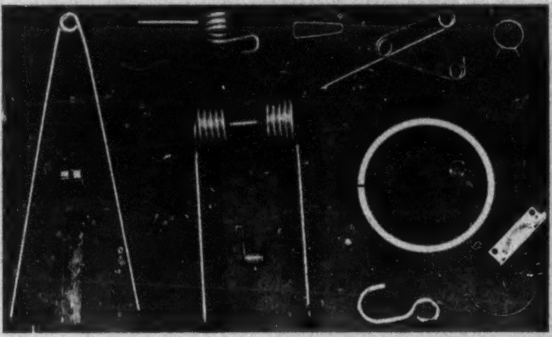

Winamac has been manufacturing springs for over 30 years. Including high quality Compression, Extension and Torsion springs. Plus, our specialty—producing heavy wire springs with up to .625" diameter wire!

Winamac springs come in hundreds of shapes and sizes and have thousands of uses. They're used in farm implements, construction equipment, appliances, RV vehicles, electrical controls, railroads and in many other industries.

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Let Winamac fill your spring needs. For more information, call or write:
**Winamac Coil Spring, Inc.**
North Smith Street Box 278 Kewanna, IN 46939 219/653-2186

Circle (33) on Reply Card

| Type of Farm Equipment | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Plows, disk, 1-way, 2-way (harrow, cylinder, great plains, all sizes) | 4,812 | 8,302 | NA | NA | NA |
| Plows, subsoiler | 1,756 | 2,383 | 8,321 | 6,964 | 8,129 |
| Plows, terracing and ditching | | | 2,308 | 2,039 | 2,261 |
| Plows, moldboard | | | | | |
| Pull-type, 1-way | 2,503 | 3,263 | 3,873 | 2,666 | 4,438 |
| Mounted, 1-way | 6,111 | 8,680 | 13,224 | 11,852 | 15,771 |
| Semi-mounted, 1-way | 11,485 | 11,817 | 18,883 | 14,099 | 22,294 |
| Pull-type and mounted, 2-way | 3,299 | 2,999 | 3,577 | 3,473 | 3,822 |
| Plows, other (except snow) | 4,654 | 6,111 | 2,610 | 2,891 | 1,795 |
| Rakes, hay, side-delivery, | 13,615 | 19,707 | 19,121 | 20,602 | 20,328 |
| Sprayers, field and row crop type: | | | | | |
| Power, self-propelled | 1,981 | 3,516 | 4,257 | 3,590 | 2,941 |
| Power, tractor-mounted | 24,250 | 25,549 | 31,089 | 22,368 | 17,228 |
| Power, non-tractor-mounted | 8,860 | 14,089 | 16,810 | 14,142 | 13,498 |
| Sprayers, power, not field or row crop type | 6,503 | 7,444 | 6,896 | 5,836 | 5,383 |
| Sprayers, power, air-carried | 6,996 | 6,286 | 9,856 | 8,019 | 7,662 |
| Spreaders, manure: | | | | | |
| Conveyor type | 11,823 | 17,029 | 16,586 | 16,528 | 16,688 |
| Tank type | 4,431 | 7,188 | 8,772 | 7,584 | 7,853 |
| Stackers, hay | NA | 1,175 | 1,806 | 1,442 | 1,037 |
| Tillage equipment, combination roller/harrows, disk or coulter, field cultivators, disk or coulter/spring tooth | 5,571 | 8,193 | 8,527 | 8,384 | 8,619 |

See footnotes at end of table.

*(More...)*

**the ALLIED-LOCKE power transmission line...**

Send us your requirements

CALL **TOLL FREE** OUTSIDE ILL. 800-435-7752
IN ILL. CALL 815-288-1471
TWX 910-642 3083

**ALLIED-LOCKE INDUSTRIES, INC.** P.O. BOX 509, DIXON, IL 61021

Circle (34) on Reply Card

## Shipments *(continued)*

| Type of Farm Equipment | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| Tool bars, basic units, pull, mounted | 4,416 | 4,277 | 7,246 | 6,715 | 8,639 |
| Tractors, tracklaying type | 16,517 | 18,208 | 19,812 | 22,057 | 19,968 |
| Tractors, wheel | | | | | |
| Farm type | 118,209 | 118,240 | 159,973 | 136,240 | 168,888 |
| Non-farm type | 7,480 | 10,029 | 18,452 | 16,741 | 17,623 |
| Transplanters and broadcast seeders | 23,854 | 20,872 | 43,672 | 27,296 | 30,250 |
| Wagons, farm type, chassis only, and trailer gear | 41,109 | 46,642 | 53,247 | 53,257 | 57,831 |
| Wagon boxes and racks for mounting on wagons and trailer gear | | | | | |
| Manual unloading or dump | 14,572 | 16,998 | 23,342 | 23,143 | 16,437 |
| Gravity unloading, grain type | 18,062 | 24,028 | 39,377 | 31,072 | 28,714 |
| Power unloading | 14,521 | 18,038 | 19,950 | 18,599 | 19,135 |
| Wagon boxes with integral running gear | 5,368 | 5,737 | 8,136 | 7,206 | 6,097 |
| Windrowers for grain, pull-type | NA | 828 | 819 | 617 | 601 |
| Windrowers for hay, self-propelled | NA | 7,163 | 5,841 | 4,098 | 6,003 |

In some cases, I&T has combined data because of space limitations. If you need more information from MA-35A, write us.
DATA: Current Industrial Reports, Series MA-35A and M-35S, Bureau of the Census.
NA – Not available or not applicable.

*Rear-mounted, four-row and larger.

**Including 469 power harrows in 1981.

***1981 includes cotton strippers.

How much you make selling farm equipment is your own business.

How much you **can** make is ours.

*Find out how you can become a VERSATILE® dealer.*
*Call Larry Leavelle, Vice President, General Manager*
*Telephone 1-816-241-6299*

**VERSATILE**
**Versatile Farm Equipment Corporation**
5900 Deramus Avenue
Kansas City, Missouri, U.S.A. 64120

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**Circle (35) on Reply Card**

M-C Flex Wing Flail Shredder

***FIRST ONE SELLS ANOTHER***

- Sizes 24′ — 30′.
- Mows and shreds and evenly spreads.
- Ideal for large farms.
- Use for wheat stubble or corn stalks.
- Saves soil moisture for the following crop.
- Makes plowing easier.

Send for more information, or call toll free

**MATHEWS COMPANY**
500 Industrial Ave. Crystal Lake, IL 60014
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**Circle (36) on Reply Card**

The business magazine of the farm & industrial equipment industry

December 1982

# Implement &Tractor

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## A quick visit with our biggest trading partner – CANADA

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P.O. Box 12901
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(a suburb of Kansas City, Mo.)
Telephone (913) 888-4664
Telex: 42-4156: Answerback
Intertec OLPK

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INTERTEC PUBLISHING CORP.

**Implement & Tractor**

*The business magazine of the farm & industrial equipment industry*

December 1982 • Vol. 97 • No. 20

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page 25

## Visiting Canada: An I&T Special Report

**C-1: A Quick Trip Across Canada.** This special section opens with the recollections of two veteran Canada watchers.

**C-6: Developing Systems for Measuring Tillage Depth.** Saskatchewan engineers are researching three new approaches.

**C-10: Spray Boom Height Affects Accuracy.** Canadian designers are searching for the optimum system.

**C-14: Selecting Equipment.** A Canadian researcher shows that personal factors are vital considerations in selecting new equipment.

**C-22: How Four Canadian Dealers Get Business Through That Long Winter.** It really isn't a problem if you plan ahead.

**C-25: Finding Every Way to Stay in Touch.** To keep up the sales volume at their Dunnville, Ont., dealership, Joe and Dave Cowan increase the frequency of sales contacts. A Canadian "1982: Year of the Salesman" article.

**10: Testing and Troubleshooting.** Hydraulic testing and troubleshooting techniques can pinpoint failures for quick repair. Part Six in the series on farm equipment hydraulics.

**16: Where Do Salesmen Need Most Help?** Three of the industry's gurus give I&T a peek at where they think the key problems lie. A "1982: Year of the Salesman" feature.

**20: Wholesalers Staying Busy.** FEWA's annual gathering draws interest of manufacturers seeking new distributive outlets.

**22: Shortliners.** The FEMA convention reveals that after a tough year, the hard pushing continues.

**25: Reps Seeking Broader Base.** At their 1982 convention AIMRA members focused on expanding their market.

**31: Prospecting for Dealers: Did You Mention Profit?** Walt Beuscher talks about making a success of selling dealerships in this "1982: Year of the Salesman" article.

**39: Tillage and Crop Production Equipment Council Looks Ahead.** The Council assesses the challenges facing the farm equipment industry today.

**On the cover...**spring tines in the yard of Morris Rod-Weeder, Minnedosa, Manitoba.

**DEPARTMENTS**

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# What's Ahead...

December, 1982

U.S. RETAIL SALES IN OCTOBER, according to the Farm & Industrial Equipment Institute's flash report, were down substantially in all product categories.

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | October | | | January-October | | |
| | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: | | | | | | |
| 2-wheel drive | | | | | | |
| 40-100 hp | 4,005 | 4,793 | -16.4 | 36,007 | 44,023 | -18.2 |
| Over 100 hp | 2,614 | 5,706 | -54.2 | 24,964 | 36,559 | -31.7 |
| Total 2-wheel drive | 6,619 | 10,499 | -37.0 | 60,971 | 80,582 | -24.3 |
| 4-wheel drive | 623 | 880 | -29.2 | 5,695 | 8,018 | -29.0 |
| Total Tractors | 7,242 | 11,379 | -36.4 | 66,666 | 88,600 | -24.8 |
| Combines (S-P) | 3,013 | 5,592 | -46.1 | 12,222 | 21,445 | -43.0 |
| Balers* | 527 | 1,097 | -52.0 | 8,402 | 13,047 | -35.6 |
| Forage Harvesters** | 868 | 1,266 | -31.4 | 4,586 | 6,523 | -29.7 |
| Mower-Conditioners | 835 | 1,293 | -35.4 | 13,143 | 17,570 | -25.2 |

*Bales under 200 lbs. **Shear-bar type.

IN BRITAIN, A CONTINUING STUDY OF AGRICULTURAL WEAR PROBLEMS is currently focusing on the use of ceramic protection for cultivator tines, plow landsides and subsoilers. Reliable bonds between ceramic and steel are now being achieved, and investigations are in progress to reduce chipping damage and of ceramic applications to other components, according to the British Society for Research in Agricultural Engineering.

SOYBEAN OIL AS A LOW-VOLUME PESTICIDE CARRIER is the subject of research at the U. of Illinois Dept. of Ag Engineering. According to researcher Jack Butler, soybean oil offers several possible advantages over water as a pesticide carrier at low application rates. It leaves non-evaporating droplets, which should drift less and deposit better on the plant. Drift is also reduced somewhat in controlled droplet application. Soybean oil, he said, may provide an increase in pesticide efficiency; a residual effect of oil may result in longer control of a particular pest. Such use of oil offers farmers a potential market totaling 20 million gallons of oil.

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I&T
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## YODER & FREY, INC.
## Archbold, Ohio
## November 9, 1982

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| H, 1945 (Fair) | 550 |
| H, 1946 (Fair) | 620 |
| M, 1951 (Good) | 850* |
| M, 1950 (Good) | 675 |
| Sup. M, 1952 (Good) | 925* |
| Sup. M, 1952 (Fair) | 775* |
| Sup. M, 1952 (Rough) | 950* |
| 300, 1956 (Fair) | 1175 |
| 400 diesel, 1957 (Rough) | 625 |
| 454, ldr., 1971 (Good) | 4300* |
| 504 diesel, 1967 (Fair) | 2400* |
| 560 diesel, 1960 (Rough) | 800* |
| 560, 1960 (Good) | 2100 |
| 600 diesel, 1957 (Rough) | 700* |
| 656, 1968 (Good) | 2725 |
| 656, 1968 (Good) | 2400* |
| 706, 1964 (Fair) | 2900 |
| 706, 1965 (Fair) | 2450 |
| 706 diesel, 1964 (Rough) | 1900* |
| 706, 1965, (Fair) | 1400* |
| 706, 1964 (Fair) | 1700* |
| 756, 1970 (Good) | 4300 |
| 766 diesel, 1976 (Fair) | 7750* |
| 806, 1965 (Good) | 2700 |
| 806 diesel, 1965 (Rough) | 3400* |
| 966 diesel, 1975 (Fair) | 6750 |
| 1206 diesel, 1967 (Good) | 5500 |
| 1466 diesel, 1976 (Good) | 8500* |
| 1468, 1972 (Fair) | 7500* |
| 1586, 1979 (Good) | 13,200* |
| 4100, (Good) | 4250* |

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| G, cult., 1951 (Rough) | 950* |
| WD-45 diesel, 1950 (Rough) | 325* |
| D-12, 1965 (Rough) | 975 |
| D-14, 1966 (Rough) | 1000* |
| D-17, 1967 (Fair) | 1400* |
| 190XT, 1967 (Rough) | 2700* |
| 190XT diesel, 1968 (Fair) | 3450* |
| 190XT, 1967 (Rough) | 4400* |
| 190XT, 1972 (Good) | 5100* |
| 180 diesel, 1967 (Fair) | 3000* |

**DAVID BROWN TRACTOR**

| | |
|---|---|
| 885, 1974 (Good) | 2800* |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 40, 1955 (Rough) | 800* |
| 40, 1954 (Fair) | 1125* |
| 40, 1956 (Rough) | 950 |
| 60, 1956 (Fair) | 750* |
| 70, 1954 (Fair) | 900* |
| 70, 1970 (Fair) | 6000* |
| 720 diesel, 1959 (Rough) | 800* |
| 720, 1957 (Fair) | 1200 |
| 720 diesel, 1957 (Fair) | 1575 |
| 720, 1958 (Fair) | 1550 |
| 830 diesel, 1959 (Fair) | 2200* |
| 1010, 1962 (Good) | 2425 |
| 2030, 1977 (Fair) | 5100 |
| 3020, 1967 (Good) | 3175 |
| 4020 diesel, 1971 (Fair) | 6950 |
| 4320 diesel, 1971 (Good) | 7250* |
| 4320, 1971 (Good) | 8300* |
| 4430 diesel, 1976 (Fair) | 8500* |
| 4430, 1977 (Good) | 12,000* |
| 5010, 1964 (Fair) | 2800* |
| 5020, 1971 (Fair) | 4500* |
| 5020, 1969 (Rough) | 4000* |
| 7520, 1970 (Good) | 12,000* |

**COCKSHUTT TRACTORS**

| | |
|---|---|
| 3, 1946 (Rough) | 1360* |
| 540 diesel, 1959 (Rough) | 675 |

**OLIVER TRACTORS**

| | |
|---|---|
| 550, 1959 (Rough) | 1250* |
| 880 diesel, 1959 (Fair) | 740 |
| 1365, 1975 (Fair) | 3750 |
| 1600, 1962 (Fair) | 2400* |
| 1650 diesel, 1966 (Rough) | 3100 |
| 1750 diesel, 1965 (Rough) | 3250 |
| 1800, 1964 (Rough) | 2000* |
| 1855 diesel, 1974 (Good) | 5400* |

**CASE TRACTORS**

| | |
|---|---|
| DC, 1946 (Fair) | 175 |
| 530 diesel, 1965 (Rough) | 1800* |
| 930, 1967 (Good) | 2500 |
| 990, (Fair) | 1625 |
| 1070 diesel, 1977 (Fair) | 6250* |
| 1070 diesel, 1976 (Fair) | 7750* |
| 1270 diesel, 1978 (Good) | 8750* |
| 2290, 1982 (Excellent) | 21,000 |
| 2290, 1982 (Excellent) | 21,000 |

**FERGUSON & MASSEY FERGUSON TRACTORS**

| | |
|---|---|
| TD-20, ldr., 1947 (Rough) | 1200 |
| TD-20, 1947 (Fair) | 750 |
| TD-30, ldr., 1950 (Rough) | 660 |
| MF-65, 1960 (Rough) | 1500* |
| MF-65, 1960 (Good) | 1750 |
| MF-165 diesel, 1970 (Good) | 3550 |
| MF-165, 1968 (Fair) | 3050* |
| MF-180 diesel, 1970 (Fair) | 3450 |
| MF-1085 diesel, 1976 (Good) | 5400 |
| MF-1800, (Fair) | 7250* |

**FORD TRACTORS**

| | |
|---|---|
| 8N, 1950 (Rough) | 875 |
| 8N, 1952 (Fair) | 1250 |
| 8N, 1948 (Fair) | 1075 |
| 8N, 1952 (Rough) | 1075* |
| 8N, 1950 (Fair) | 900 |
| 9N, 1944 (Rough) | 750* |
| 9N, 1944 (Fair) | 1050* |
| 9N, 1945 (Fair) | 800 |
| 901, ldr., 1957 (Rough) | 1000 |
| 3000, 1971 (Fair) | 2250 |
| 3000, 1971 (Fair) | 2700 |
| 4000 diesel, 1967 (Rough) | 3350* |
| 4000, 1971 (Good) | 4900 |
| 4000, (Good) | 2500 |
| 5000 diesel, 1969 (Rough) | 4900* |
| 8000 diesel, 1971 (Rough) | 4750* |
| 1700 diesel, 1981 (Excellent) | 3650* |

**MASSEY-HARRIS TRACTOR**

| | |
|---|---|
| 44, 1950 (Fair) | 475* |

**MINNEAPOLIS-MOLINE TRACTOR**

| | |
|---|---|
| M-670, ldr., (Good) | 3000 |

**WHITE TRACTOR**

| | |
|---|---|
| 2-60 diesel, | 6950 |

## JONES FARM EQUIPMENT CO.
## Dothan, Alabama
## November 9, 1982

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| 175 diesel, 1978 (Good) | 4300* |
| 170 diesel, 1969 (Rough) | 1400 |
| ED40 diesel, 1968 (Good) | 1000 |

**DEUTZ TRACTORS**

| | |
|---|---|
| 6006 diesel, (Fair) | 2400* |
| 4006 diesel, 1973 (Fair) | 1100* |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 1210 diesel, 1973 (Good) | 3100* |
| 990 diesel, 1968 (Excellent) | 2750 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1085 diesel, 1974 (Fair) | 4250 |
| 1085 diesel, 1973 (Fair) | 4325 |
| 245 diesel, 1976 (Good) | 4500* |
| 245 diesel, 1976 (Good) | 4800 |
| 245 diesel, 1976 (Good) | 4600 |
| 245 diesel, 1976 (Good) | 4700* |
| 175 diesel, 1974 (Good) | 3700* |
| 175 diesel, 1972 (Good) | 3750* |
| 175 diesel, 1969 (Good) | 4025 |
| 175 diesel, 1967 (Good) | 3600 |
| 165 diesel, 1973 (Good) | 3600 |
| 165 diesel, 1971 (Fair) | 3000 |
| 165 diesel, 1970 (Excellent) | 4100* |
| 165 diesel, 1969 (Rough) | 1800* |
| 165 diesel, 1967 (Good) | 3500* |
| 165 diesel, 1967 (Excellent) | 3900* |
| 165 diesel, 1966 (Rough) | 2300 |
| 165 diesel, 1966 (Fair) | 3050* |
| 135 diesel, 1966 (Excellent) | 3500 |
| 135 diesel, 1966 (Good) | 3100 |
| 130 diesel, 1968 (Fair) | 1950 |
| 65 diesel, 1964 (Fair) | 1400 |
| 65 diesel, 1964 (Good) | 1925 |
| 35 diesel, 1963 (Good) | 2000* |
| 35, 1962 (Good) | 1900 |
| 35, 1962 (Good) | 2150 |
| 35 diesel, 1958 (Rough) | 825 |
| TO20, 1949 (Good) | 950 |

**FORD-FERGUSON TRACTORS**

| | |
|---|---|
| 9N, blade, cutter, 1945 (Good) | 1175 |
| 9N, 1943 (Fair) | 750 |

**FORD TRACTORS**

| | |
|---|---|
| 9000 diesel, 1972 (Good) | 3700* |
| 8600 diesel, 1974 (Fair) | 5000 |
| 5600 diesel, 1976 (Good) | 5900 |
| 5000 diesel, 1975 (Good) | 4700 |
| 5000 diesel, 1973 (Excellent) | 5100* |
| 5000 diesel, 1970 (Good) | 4500 |
| 5000 diesel, 1968 (Rough) | 2950 |
| 4000 diesel, 1978 (Excellent) | 5800* |
| 4000 diesel, 1970 (Good) | 4100* |
| 4000 diesel, 1965 (Rough) | 950* |
| 3000 diesel, 1973 (Excellent) | 4300 |
| 3000 diesel, 1968 (Good) | 3300 |
| 3000, burned, 1966 (Rough) | 725 |

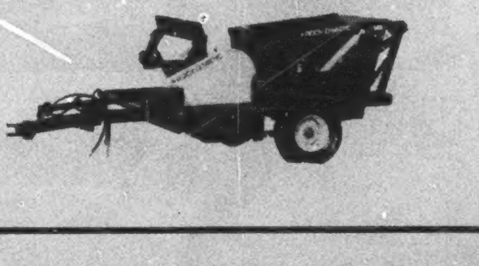
*(More...)*

ROCK-O-MATIC MODEL 546 ROCKPICKER

PTO, Hyd. or ground drive

ROCK-O-MATIC IND.
Box 1607, MINOT, ND
(701) 852-5833
or WICHITA, KS
(316) 945-0295

Circle (34) on Reply Card



# Auctions
*(continued)*

| | |
|---|---|
| 3000 diesel, 1966 (Good) | 2875 |
| 3000 diesel, 1966 (Good) | 3450* |
| 2000, Select-O-Speed, 1964 (Good) | 1600 |
| 2000 diesel, 1963 (Rough) | 1000 |
| 641, 1959 (Good) | 1900* |
| 641, 1958 (Fair) | 1150 |
| Dexta, 1960 (Good) | 1750 |
| Dexta, 1958 (Fair) | 1050* |
| Dexta, 1961 (Good) | 1750 |
| Dexta, 1961 (Good) | 1750 |
| 8N, 1952 (Excellent) | 1950 |
| 8N, 1951 (Good) | 1250 |
| 8N, 1951 (Good) | 1200 |
| 8N, 1950 (Good) | 1000 |
| 8N, 1948 (Rough) | 550 |

### INTERNATIONAL HARVESTER TRACTORS

| | |
|---|---|
| 1466 diesel, 1975 (Good) | 7350* |
| 666 diesel, 1973 (Good) | 3500* |
| 656 diesel, 1967 (Rough) | 1700 |
| 484 diesel, 1979 (Excellent) | 8500* |
| 444 diesel, 1969 (Good) | 2400 |
| B414, ldr., 1963 (Rough) | 625 |
| H, 1941 (Good) | 375* |
| Sup. A, 1948 (Excellent) | 1650* |
| A, 1942 (Fair) | 250 |
| A, 1942 (Fair) | 325 |
| Cub, 1951 (Good) | 1450 |
| Cub, cult., 1950 (Good) | 1200 |

### JOHN DEERE TRACTORS

| | |
|---|---|
| 4040 diesel, cab, duals, 1978 (Excellent) | 14,600 |
| 4020 diesel, 1969 (Good) | 5500 |
| 4020 diesel, 1969 (Good) | 5100* |
| 4020 diesel, 1968 (Good) | 4700 |
| 2040 diesel, 1976 (Good) | 5400 |
| 2030 diesel, 1974 (Good) | 3650 |
| 2020 diesel, 1969 (Good) | 3600* |
| 2010, 1963 (Good) | 1800 |
| 820 diesel, 1974 (Good) | 2450 |

### LONG TRACTORS

| | |
|---|---|
| 900 diesel, (Fair) | 1750 |
| 560 diesel, (Good) | 3800* |

### OLIVER TRACTOR

| | |
|---|---|
| 1955 diesel, 1971 (Fair) | 3300 |

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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*The business magazine of the farm & industrial equipment industry*

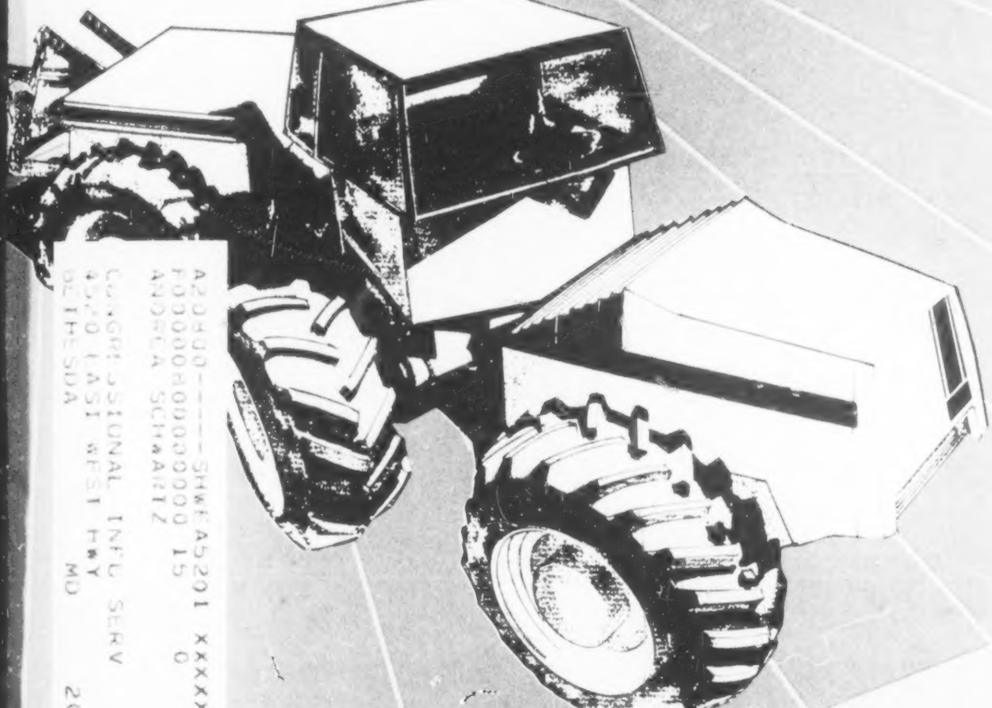
January 1983
TWO DOLLARS

# Implement &Tractor

## 18th annual Engineering Concepts issue

# THE FUTURE TRACTOR: WHAT CAN WE EXPECT?

**Special series starts on page 11**



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**Implement &Tractor**

*The business magazine of the farm & industrial equipment industry*

January 1983 • Vol. 98 • No. 1

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## 18th Engineering Concepts Issue

# THE FUTURE TRACTOR

**11:** **Introduction: Tractors of Tomorrow** – who can predict the designs we'll see in the next decade? To prepare you for this four-part series, we examine some predictions of the past.

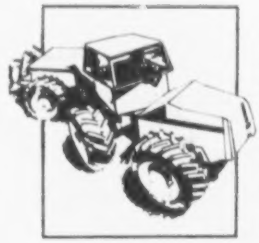
**12:** **Future Tractors: Size and Shape of Things to Come.** Some of the professional dreamers among the manufacturers' experts share their thoughts.

---

**14:** **Some Tractors for Today.** After all that conjecture, here's a look at a few of the newly introduced models that have to be sold *now*.

**18:** **Jim Anderson's Prescription for Survival.** As we enter what looks like another tough year, this California dealer reminds us about some of the basics we must consider if we want to stay in the game.

**34:** **Sales Territory: What Size is Right? Dealer Numbers: What's Optimum?** Walt Buescher, the veteran sales executive, reflects on some of the knotty problems that sales managers must face in getting the right balance in the field.



**On the cover...**To symbolize the theme of our 18th Engineering Concepts Issue, we're showing this sketch that some J I Case Co. idea men worked up a while back.

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# What's Ahead...

January 1983

CANADIAN MARKET FORECAST: ABOUT LIKE LAST YEAR. The Canadian Farm & Industrial Equipment Institute's annual meeting has produced an outlook report indicating that 1983 unit retail sales will run approximately level with 1982 performance:

| | | Unit Retail Sales | |
|---|---|---|---|
| Product | 1981(a) | 1982(e) | 1983(f) |
| Farm Wheel Tractors | | | |
| All, Eastern Canada | 11,426 | 9,856 | 9,985 |
| All, Western Canada | 15,548 | 11,127 | 11,132 |
| Two-Wheel Drive: | | | |
| 9-19 hp | 1,553 | 1,896 | 1,567 |
| 20-39.9 hp | 2,118 | 1,675 | 1,704 |
| 40-99.9 hp | 10,609 | 8,228 | 8,534 |
| 100 hp and over | 8,356 | 5,772 | 6,010 |
| Four-Wheel Drive: | | | |
| Under 200 hp | 2,554 | 1,793 | 1,734 |
| 200 hp and over | 1,794 | 1,622 | 1,568 |
| Front-Wheel Assist: | | | |
| Under 40 hp | 1,798 | 1,818 | 1,861 |
| 40-99.9 hp | 2,259 | 1,670 | 1,798 |
| 100 hp and over | 297 | 201 | 226 |
| Swathers, Self-Propelled | 4,280 | 3,145 | 3,262 |
| Swathers, Pull-Type | 4,387 | 3,130 | 3,121 |
| Combines, Self-Propelled | 4,915 | 3,067 | 3,151 |
| Combines, Pull-Type | 2,478 | 1,572 | 1,731 |
| Corn Heads | 940 | 594 | 563 |
| Balers (under 200 lbs.) | 3,252 | 2,325 | 2,367 |
| Balers (200 lbs. and over) | 3,264 | 2,522 | 2,670 |
| Forage Harvesters (shear-bar type) | 1,349 | 869 | 827 |
| Mower-Conditioners | 4,023 | 2,865 | 2,970 |
| Moldboard Plows (pull-type, mounted) | 4,093 | 3,047 | 3,092 |
| Chisel Plows | 4,060 | 3,600 | 3,483 |
| Diskers | 2,251 | 1,750 | 1,737 |
| All Disk Harrows | 4,454 | 3,075 | 3,286 |
| All Grain Drills | 8,953 | 7,056 | 7,012 |
| Corn Planters | 1,531 | 1,116 | 1,217 |
| Manure Spreaders | 2,502 | 2,575 | 2,602 |
| Grinder-Mixers | 1,135 | 972 | 950 |

Source: Canadian Farm & Industrial Equipment Institute.
(a) actual retail sales. (e) actual sales plus estimates on the 4th period. (f) forecast by participating manufacturers of CFIEI.

*(Continued on facing page)* →

# Editor's Notebook

Bill Fogarty

## Outlook Time: FIEI's Barker Takes His Turn

It's prediction season again, time for industry soothsayers to assess the outlook for the coming year. As evidence, you'll find the Canadian forecast on the opposite page, for starters. And later this month, U.S. farm equipment marketers will gather at the Farm & Industrial Equipment Institute's Marketing & Management Conference to issue their group prediction.

From a different, and safer, perspective, I&T's special contributor, Frank Buckingham, launches a four-part series that takes a look at the tractor of the future. This kind of future-gazing is safer because if we're wrong about what happens in 1990 or 1995, who's to remember? And if it's remembered, and challenged, we'll think of some plausible excuse by then. (Economists do it. Why can't we?)

Emmett Barker, president of the FIEI, recently played a role in the USDA's annual Outlook Conference, taking a look at several immediate, intermediate and long-term aspects of the business.

Of the next 24 months, he said: "Manufacturers believe a slow but firming trend in levels of equipment purchasing will take place over the next several months with a much stronger response in late 1983 and 1984."

Barker cites some of the things that will bring farmers back into the equipment marketplace. The obvious ones are lower levels of inflation and reduced borrowing costs, as well as the fact that many pieces of presently owned machinery have been pushed to the limit. But he also points out that "fully informed bankers will soon begin advising their farmer clients to take advantage of price discounting which will disappear as dealer and manufacturer inventories are brought under control." Further, Barker suggests that some farmers are doing better than they care to admit to neighbors, particularly those whose 1982 production was booked at prices far more favorable than we have now. "Banker encouragement to buy," he says, "could be especially prevalent where farmers have little or no debt, significant land equity and also have CDs maturing now."

Another factor he cites: The emergence of the skilled manager who views acquiring new equipment in a broader business context than current profitability situations. "This will lead to a more constant upgrading," he says.

From there, Barker assesses some intermediate consequences—the next three to eight years—of the depressed sales levels and loss of corporate profitability we've been going through.

•**Economic dislocations experienced by this business may slow down the rate of new product introductions.** Capital for retooling isn't available; R&D people and

*(More...)*

NOVEMBER U.S. RETAIL SALES WERE DOWN in all categories reported by the Farm & Industrial Equipment Institute in its flash report.

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | November | | | January-November | | |
| | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: | | | | | | |
| 2-wheel drive | | | | | | |
| 40-100 hp | 2,588 | 3,114 | -16.9 | 38,581 | 47,137 | -18.2 |
| Over 100 hp | 2,043 | 3,143 | -35.0 | 27,006 | 39,702 | -32.0 |
| Total 2-wheel drive | 4,631 | 6,257 | -26.0 | 65,587 | 86,839 | -24.5 |
| 4-wheel drive | 388 | 845 | -54.1 | 6,082 | 8,863 | -31.4 |
| Total Tractors | 5,019 | 7,102 | -29.3 | 71,669 | 95,702 | -25.1 |
| Combines (S-P) | 1,723 | 3,464 | -50.3 | 13,943 | 24,909 | -44.0 |
| Balers* | 265 | 328 | -19.2 | 8,671 | 13,375 | -35.2 |
| Forage Harvesters** | 379 | 832 | -54.4 | 4,961 | 7,355 | -32.5 |
| Mower-Conditioners | 383 | 440 | -13.0 | 13,529 | 18,010 | -24.9 |

*Bales under 200 lbs. **Shear-bar type.

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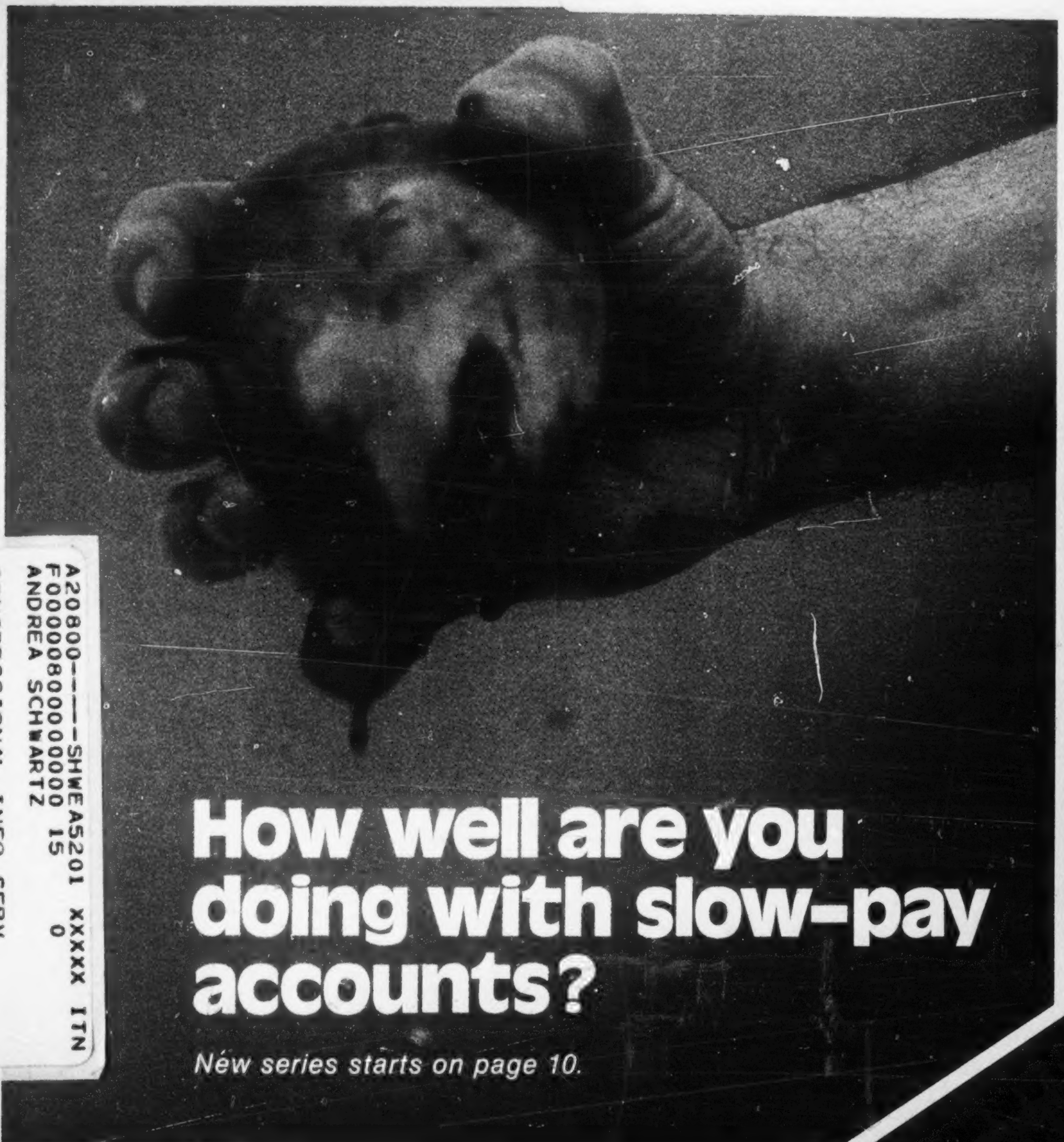

# How well are you doing with slow-pay accounts?

*New series starts on page 10.*

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*The business magazine of the farm & industrial equipment industry*

February 1983 • Vol. 98 • No. 3

**8:** **Tomorrow's Tractor Fuel? Diesel.** Part II of our Future Tractor Series finds experts predicting that diesels will remain the prime mover in ag equipment, with some changes.

**10:** **Credit and Collections.** If that cover photo caught your attention, you'll enjoy this new series that opens with a look at how receivables tie in to bottom line profit.

**12:** **Collect your Money and Keep your Customer.** Two dealers give solid advice on how to handle the customer who wants credit.

**18:** **Front Wheel Assist: A study questions its value.** Research shows 2WD tractors may not need driven front wheels, and some sharp reactions are heard from tractor executives.

**26:** **Two-Year Forecast Sees Hope and Changes.** A stronger market with a smaller dealer network are foreseen by many in this first of two parts on the FIEI Marketing & Management Conference.

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**On the Cover...**After working on our credit and collection series, we found you *can* squeeze blood out of a turnip with a little advance preparation.

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# What's Ahead...

February 1983

U.S. RETAIL SALES OF FARM EQUIPMENT in December followed the general downward trend of earlier months, except for an improvement in combine sales, according to the Farm & Industrial Equipment Institute flash report:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | December | | | January-December | | |
| | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: | | | | | | |
| 2-wheel drive | | | | | | |
| 40-100 hp | 2,482 | 3,836 | -35.3 | 41,056 | 50,973 | -19.5 |
| Over 100 hp | 2,241 | 3,477 | -35.5 | 29,254 | 43,179 | -32.2 |
| Total 2-wheel drive | 4,723 | 7,313 | -35.4 | 70,310 | 94,152 | -25.3 |
| 4-wheel drive | 701 | 820 | -14.5 | 6,782 | 9,683 | -30.0 |
| Total Tractors | 5,424 | 8,133 | -33.3 | 77,092 | 103,835 | -25.8 |
| Combines (S-P) | 2,261 | 1,922 | +17.6 | 16,208 | 26,831 | -39.6 |
| Balers* | 234 | 272 | -14.0 | 8,898 | 13,647 | -34.8 |
| Forage Harvesters** | 183 | 249 | -26.5 | 5,140 | 7,604 | -32.4 |
| Mower-Conditioners | 458 | 511 | -10.4 | 13,985 | 18,521 | -24.5 |

*Bales under 200 lbs. **Shear-bar type.

Note: FIEI's 1983-1984 retail sales forecast appears on page 26 of this issue. Subsequently, there may be some refinement of the forecast (taken among members in December) as a follow-up study to assess the impact of the USDA's Payment-in-Kind program.

CANADIAN RETAIL SALES in 1982 presented a picture similar to that of the U.S., according to the Canadian Farm & Industrial Equipment Institute:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | December | | | January-December | | |
| | 1982 | 1981 | Pct. Change | 1982 | 1981 | Pct. Change |
| Farm Wheel Tractors: | | | | | | |
| 2-wheel drive | | | | | | |
| 40-100 hp | 550 | 677 | -18.8 | 8,886 | 10,846 | -18.1 |
| Over 100 hp | 445 | 663 | -32.9 | 6,359 | 8,522 | -25.4 |
| Total 2-wheel drive | 995 | 1,340 | -25.7 | 15,245 | 19,368 | -21.3 |
| 4-wheel drive | 276 | 464 | -40.5 | 3,217 | 4,365 | -26.3 |
| Total Tractors | 1,271 | 1,804 | -29.5 | 18,462 | 23,733 | -22.2 |
| Mower-Conditioners | 62 | 52 | +19.2 | 2,713 | 3,878 | -30.0 |
| Balers: under 200 lbs. | 77 | 49 | +57.1 | 2,334 | 3,232 | -27.8 |
| over 200 lbs. | 61 | 64 | - 4.7 | 2,346 | 3,159 | -25.7 |
| Forage Harvesters* | 32 | 25 | +28.0 | 794 | 1,282 | -38.1 |
| Combines: pull-type | 61 | 53 | +15.1 | 1,657 | 2,481 | -33.2 |
| self-propelled | 200 | 320 | -37.5 | 3,541 | 5,055 | -29.9 |
| Swathers: pull-type | 67 | 86 | -22.1 | 3,658 | 4,469 | -18.1 |
| self-propelled | 102 | 222 | -54.1 | 3,155 | 4,295 | -26.5 |

*shear-bar type.

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**Peter Perkins** (FMC Corp.) delivered the State of the Industry report at the FIEI Marketing & Management Conference last month at Naples, Fla.

## FORECASTING FARM EQUIPMENT SALES, 1983, 1984

(Retail sales of units, United States)

| | | | | Sales Forecast | | | |
|---|---|---|---|---|---|---|---|
| Product | 1981 Actual Sales | 1982 Actual Sales* | Pct. Change from 1981 | 1983 Unit Sales | Pct. Change from 1982 | 1984 Unit Sales | Pct. Change from 1983 |
| Farm Tractors: | | | | | | | |
| Under 40 HP | 47,800E | 42,000E | – 12.0 | 43,260 | + 3.0 | 45,400 | + 5.0 |
| 40-99 HP | 50,973 | 41,000 | – 19.6 | 42,517 | + 3.7 | 45,000 | + 5.8 |
| 100 HP and over | 43,179 | 29,500 | – 31.7 | 31,000 | + 5.1 | 34,000 | + 9.7 |
| Four-wheel drive | 9,683 | 6,900 | – 26.7 | 7,150 | + 16.6 | 7,850 | + 9.8 |
| Total (40 HP and over) | 103,835 | 77,300 | – 25.6 | 80,500 | + 4.1 | 86,800 | + 7.8 |
| S-P Combines | 26,831 | 16,208 | – 39.6 | 18,330 | + 13.1 | 20,000 | + 7.6 |
| Corn Heads | 15,700 | 9,800 | – 37.6 | 10,500 | + 7.1 | 12,400 | + 18.1 |
| Forage Harvesters (1) | 7,604 | 5,250 | – 31.0 | 5,550 | + 5.7 | 6,150 | + 10.8 |
| Balers (2) | 13,647 | 8,950 | – 34.4 | 8,900 | + 0.6 | 9,900 | + 11.2 |
| Balers (3) | 16,400E | 10,900E | – 33.5 | 11,600 | + 6.5 | 12,760 | + 10.0 |
| Windrowers | 5,291 | 4,300 | – 20.0 | 4,300 | 0.0 | 4,850 | + 12.8 |
| Mower-Conditioners | 18,521 | 13,950 | – 24.7 | 14,250 | + 2.2 | 15,818 | + 11.0 |
| Moldboard Plows | 18,500E | 12,025E | – 35.0 | 12,025 | 0.0 | 12,325 | + 2.5 |
| Disk Harrows | 45,100E | 29,300E | – 35.0 | 30,765 | + 5.0 | 33,850 | + 10.0 |
| Field Cultivators | 14,000E | 9,675E | – 30.9 | 10,160 | + 5.0 | 11,175 | + 10.0 |
| Chisel Plows | 13,440E | 8,700E | – 35.0 | 9,135 | + 5.0 | 10,050 | + 10.0 |
| Grinder-Mixers | 5,945 | 4,800 | – 19.2 | 5,000 | + 4.2 | 5,400 | + 8.0 |
| Manure Spreaders (4) | 11,773 | 10,050 | – 14.6 | 10,500 | + 4.3 | 11,500 | + 9.5 |

*Preliminary figures. E – I&T estimates. (1) Shear-bar type. (2) Bales under 200 lbs. (3) Bales over 200 lbs. (4) Conveyor type.
Source: Farm & Industrial Equipment Institute.

## Marketing & Management Conference, part 1:

# Forecast indicates 2nd-half improvement, better 1984

"State of the Industry" outlook spans two years, expects moderate increases. Participants comment on the changed marketing-distribution climate of the future. **By Bill Fogarty**

■FAIR WARNING: When the Farm & Industrial Equipment Institute circulated its State of the Industry sales outlook survey form among member companies of its Farm Equipment and Agri-Equipment divisions, the government's "payment-in-kind" program was not yet in place.

Thus, the numbers you see in the tables with this article are "pre-PIK"—though the likelihood of payment-in-kind seemed apparent to many people who were following the plan's development in the news in December.

The survey had 41 participants among Farm Equipment Div. members and 40 in the Agri-Equipment Div. When Peter Perkins (FMC Corp.) delivered the outlook report in late January to the Marketing & Management Conference, the percentages and unit figures he provided were median expressions of the groups' estimates.

**Retail volume.** Asked what they thought 1983 would produce in retail dollar volume, FED respondents (marketers of field equipment) saw, in median, no change from 1982. The AED (farmstead equipment) members expect a five per cent improvement.

Among FED respondents, the range was from an improvement of 15 per cent to a decline of 18 per cent. The AED group's estimates ranged from a 30 per cent rise to a 10 per cent drop.

Actually, more Farm Equipment Div. participants saw an increase (17) than saw no change (15) or a drop (9). Five of the FED group in-

(More...)

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## AGRI-EQUIPMENT FORECASTS, 1983, 1984

**(Per cent change, retail dollar volume)**

| Product Group | 1983 | 1984 |
|---|---|---|
| Chemical Application Equipment | + 5.0 | + 4.0 |
| Portable Augers, Elevators | 0.0 | + 5.0 |
| Bin-Type Crop Dryers | + 1.0 | + 5.0 |
| Batch, Continuous-Flow Dryers | 0.0 | + 7.0 |
| Dairy and Beef Equipment | + 1.0 | + 5.0 |
| Hog Equipment | + 10.0 | + 8.0 |
| Grain Bins | − 5.0 | − 8.0 |
| Milking Machines | + 5.0 | + 4.0 |

Source: Farm & Industrial Equipment Institute.

## Industry Outlook

*(continued)*

dicated they thought there would be a sales increase in the first half of the year, 27 in the second half. For the AED participants, eight saw a first-half pickup, 21 picked the second half.

### Major marketing changes

Participants were asked to comment on major changes they see coming in marketing and distribution of farm equipment, "given the detrimental economic impact on manufacturers and their dealers caused by the prolonged recession."

There were over 70 responses to this item from participants of both divisions. Some were taking a long-range view in replying while others were concerned with the immediate future. Some viewpoints contradicted others. The general consensus was that there will be less inventory in the field, shorter terms for dealers, more multiple-line dealerships, fewer total dealers and manufacturers, more advance buying by farmers, the slimming down of manufacturers' product lines, and generally greater operating efficiencies by the survivors.

Here are a few of the remarks among the responses:

"Eventually, less selling from inventory, more building to order, tightening of company-funded floor and finance plans, maybe more companies bypassing conventional selling methods; one or more middlemen may be dropped"... "Manufacturers will be cutting down on inventories, which may create shortages by early 1984"... "Fewer dealers, stronger dealers, more control of dealers by major tractor manufacturers, increased reliance on manufacturers for financing when equipment becomes due,

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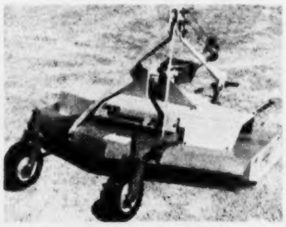

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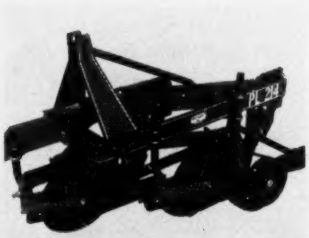
Ruggedly built for long life. Heavy steel deck. Three overlapping suction blades. Smooth clean cut from 1". Designed for 15 to 40 H.P. tractors.

MOLDBOARD PLOW
One or two bottom plows equipped with a 12", 14", or 16" general purpose bottom. These plows are designed for low draft, high-speed plowing. One piece welded frame.



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HAWKEYE
TV from Outer Space
The Hawkeye Satellite TV antenna is a high quality system designed to greatly expand your TV horizons. Rugged, simple and quick to install, it is the industry standard of excellence. Inquire about our exclusive fast installation trailer and pre-cast concrete mounting base.

Hawkeye Satellite Antennas
15455 Metcalf Ave., Stanley, KS 66223
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Dealer and individual inquiries invited

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continued price resistance by buyers"..."Less integrated majors, fewer and stronger shortlines, severe battle among majors for tractor and combine sales"..."Capacity to produce will be significantly reduced" ..."Less dealer inventory, faster turnover, fewer single-franchise dealers, fewer suppliers in the industry, with an outflow of capital into other, more profitable areas."

"Gross margins in most farm equipment won't allow manufacturers to carry the burden and we can no longer pass the entire cost on to the farmer. As a result, when business picks up, farmers will have to wait for preferred brands or accept second or third choice. Middlemen will be most apt to be hurt as economics and market will encourage more manufacturers to sell direct to dealers, bypassing distributors."

"Companies will sell off or discontinue manufacture or marketing of unprofitable or marginal products"..."More specialization of manufacturers in terms of product or geographic strength, increased involvement between manufacturer and customer."

"Entire industry, top to bottom, weakened. Cost of sale from historical methods of solicitation will change, but a means of one-on-one must be retained. Perhaps more expectations of local dealers with commensurate opportunity for profit will return to prominence."

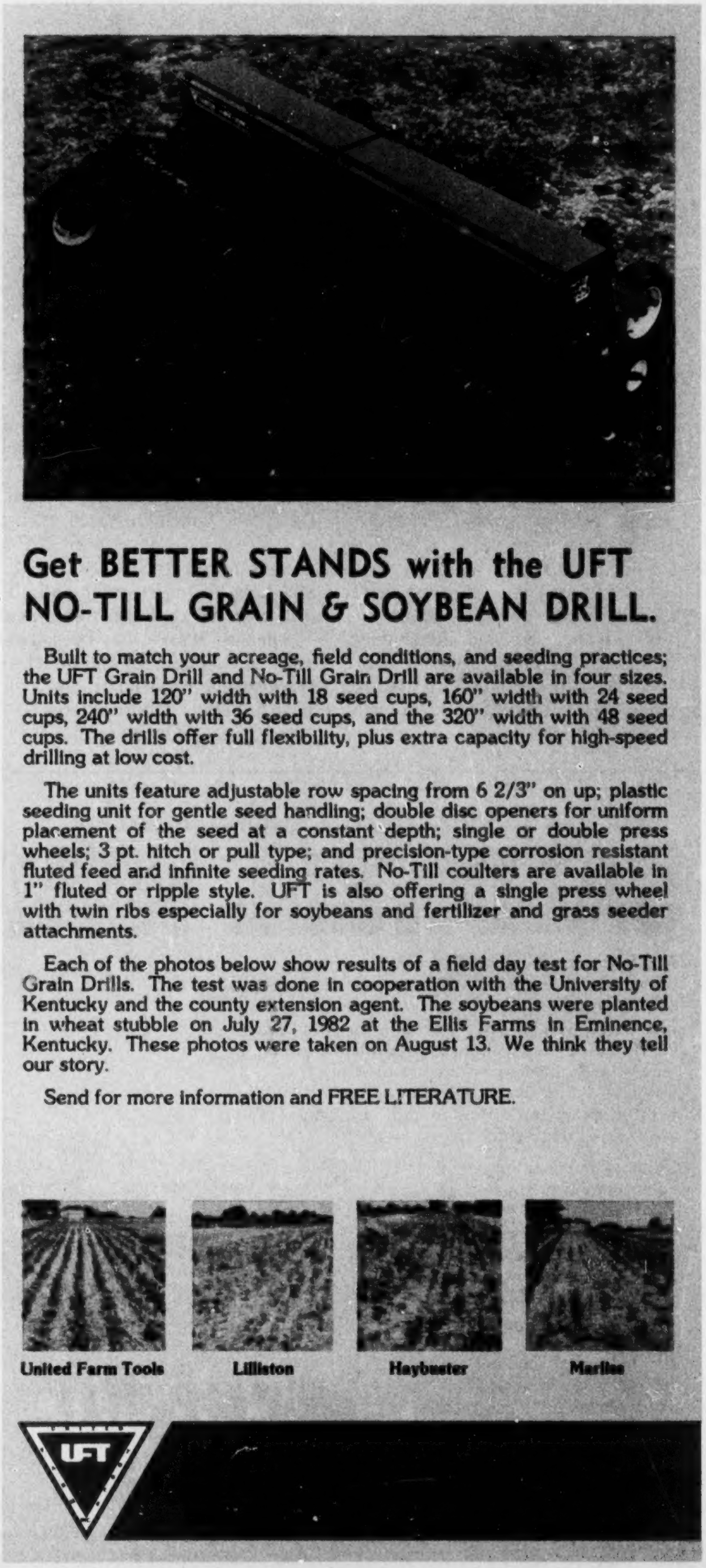
"Dealers working smarter, distributors becoming extinct. Highly leveraged manufacturers heading into oblivion. Terrible shake-out in next nine months. Manufacturers have simply not pursued a conservative fiscal course for the last three years—it's killing them."

"Mid-size dealerships (five men) are under pressure due to cash flow problems to get out of business. We'll see enlargement of some dealers to cover larger areas with more products to meet cash flow needs and farmers' demands. Also, a resurgence of mom-and-pop dealerships—they can cut costs more effectively than other-sized dealerships—is negative, but a fact of life."

### The embargo, exports

One question put to respondents: "What effect do you think (the President's lifting the embargo on

*(More...)*



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Built to match your acreage, field conditions, and seeding practices; the UFT Grain Drill and No-Till Grain Drill are available in four sizes. Units include 120" width with 18 seed cups, 160" width with 24 seed cups, 240" width with 36 seed cups, and the 320" width with 48 seed cups. The drills offer full flexibility, plus extra capacity for high-speed drilling at low cost.

The units feature adjustable row spacing from 6 2/3" on up; plastic seeding unit for gentle seed handling; double disc openers for uniform placement of the seed at a constant depth; single or double press wheels; 3 pt. hitch or pull type; and precision-type corrosion resistant fluted feed and infinite seeding rates. No-Till coulters are available in 1" fluted or ripple style. UFT is also offering a single press wheel with twin ribs especially for soybeans and fertilizer and grass seeder attachments.

Each of the photos below show results of a field day test for No-Till Grain Drills. The test was done in cooperation with the University of Kentucky and the county extension agent. The soybeans were planted in wheat stubble on July 27, 1982 at the Ellis Farms in Eminence, Kentucky. These photos were taken on August 13. We think they tell our story.

Send for more information and FREE LITERATURE.

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## Industry Outlook
*(continued)*

grain sales to the U.S.S.R.) will have on commodity prices in 1983?"

This produced a long succession of responses that were unusually close to being uniform and amounted to: "Little or none." One respondent said: "He still hasn't lifted the grain embargo—read the small print!"

The question was followed by a request for recommendations as to how U.S. exports of farm products could be expanded. Replies generally called on the government to play an active role in promoting farm products overseas and facilitating their movement through barter, subsidy, lowering the value of the dollar against other currencies, establishing America as a "reliable supplier," providing more food aid for needy nations and lowering the discount rate.

One respondent said, unashamedly: *"Pray for crop failure of competitors.* This comment may be closer to factual requirements than one would like to admit. The one single immediate factor affecting expanding market opportunities is climate conditions in foreign crop producing nations...."

The Marketing & Management Conference will meet again in May at Moline, Ill., and, if the custom is continued, update its forecast. I&T

# Industry in Motion

The American Society of Agricultural Engineers has awarded the FIEI Young Researcher Award to **David W. Smith,** research engineer at **Deere & Co.,** and the FIEI Engineering Merit Award to **Arnold A. Skarjune,** product safety administrator for **White Farm Equipment.**

**Allen E. Murfin** has been named associate director of the **Southwest Hardware & Implement Assn.,** Fort Worth, Tex., according to R. B. Allen, executive vice-president.

**Crary Co.,** West Fargo, N.D., has named David S. Majkrzak vice-president of engineering. He was previously reliability manager at Steiger Tractor, Inc. of Fargo.

**Wilton Corp.,** Des Plaines, Ill., has acquired the agricultural and industrial hub and spindle business of **Firestone Tire & Rubber Co.** This product line was formerly produced and marketed by Electric Wheel Co., Quincy, Ill., a Firestone division.

Leonard W. Jankowski, senior product manager, **Lindsay Brothers Inc.,** Milwaukee, Wis., has retired after 37 years' service.

**Agrotec Inc.,** Salisbury, Md., manufacturer of sprayers and liquid fertilizer application equipment, has purchased the plant and equipment assets of **Johnson Mfg. Co.,** Pendleton, N.C., also a producer of sprayers and fertilizer applicators. Both brand names will continue to be manufactured.

**Irridelco Corp.,** formerly the Irrigation & Industrial Development Corp., has established new corporate headquarters at 440 Sylvan Ave., Englewood Cliffs, N.J. 07632.

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The business magazine of the farm & industrial equipment industry

March 1983
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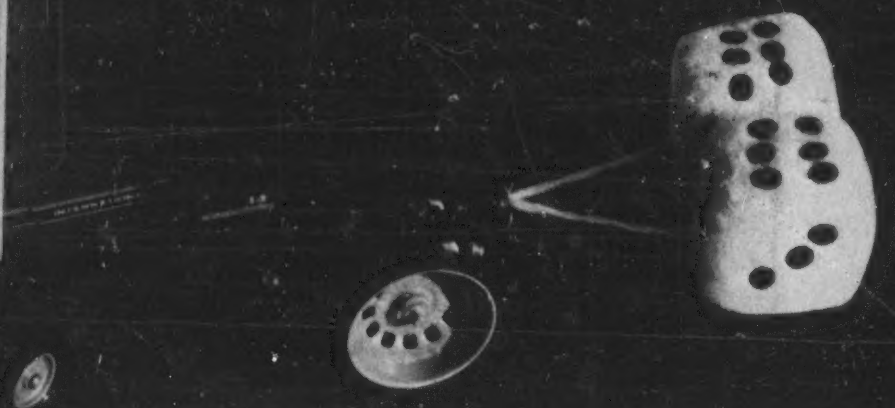

## TILLAGE— still the farmer's biggest gamble

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INTERTEC PUBLISHING CORP.

# Implement & Tractor

*The business magazine of the farm & industrial equipment industry*

March 1983 • Vol. 98 • No. 4

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**8:** **Electronic Tractor Controls.** Part 3 of our Future Tractor Series looks at the future of computer systems that operate farm marchinery, with an overview of some systems that are working the fields today.

**12:** **FIEI Marketing & Management Conference.** Coping with Federal Policies and Weak Sales. Industry leaders look at government trade, energy and farm policies, and the prospects for survival if equipment sales stay down or drop lower.

**20:** **Taking the Risk Out of Tillage.** Contributing editor Frank Buckingham finds that while the perfect tillage system hasn't yet been found, research is going ahead to help farmers cut their losses in the world's oldest gambling game.

**26:** **Computer Management and New Tractors.** Massey-Ferguson dealers came, saw, and bought in-house computer systems in Phoenix while seeing the new lineup of M-F tractors and implements, plus the new Landini tractor line from a Massey subsidiary.

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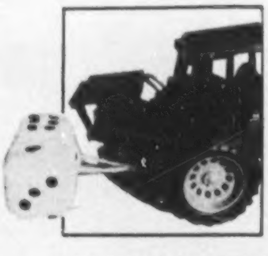

**On the cover...**Our ace photographer couldn't find dice big enough, so he scaled down the tractor to create our cover shot.

**DEPARTMENTS**

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# What's Ahead...

March 1983

JANUARY RETAIL SALES OF FARM EQUIPMENT IN THE U.S. opened with a decline against January 1982, according to the Farm & Industrial Equipment Institute flash report, in all product categories except self-propelled combines, which were up sharply. Combine sales also took a jump in December. With the January data, sales of under-40-hp tractors are reported publicly for the first time in years.

| | January Unit Retail Sales | | |
|---|---|---|---|
| | 1983 | 1982 | Pct. Change |
| Farm Wheel Tractors: | | | |
| 2-wheel drive | | | |
| Under 40 hp | 2,020 | 2,398 | -15.8 |
| 40 and under 100 hp | 2,604 | 3,426 | -24.0 |
| 100 and under 140 hp | 1,421 | 2,499 | -43.1 |
| 140 hp and over | 925 | 1,259 | -26.5 |
| Total 2-wheel drive | 6,970 | 9,582 | -27.3 |
| 4-wheel drive | | | |
| Under 200 hp | 186 | 293 | -36.5 |
| Over 200 hp | 206 | 369 | -44.2 |
| Total 4-wheel drive | 392 | 662 | -40.8 |
| Total Farm Wheel Tractors | 7,362 | 10,244 | -28.1 |
| Combines (S-P) | 1,804 | 1,374 | +31.3 |
| Balers* | 372 | 396 | - 6.1 |
| Forage Harvesters** | 174 | 320 | -45.6 |
| Mowers Conditioners | 556 | 640 | -13.1 |

*Bales under 200 lbs. **Shear-bar type.

BOTH EXPORTS AND IMPORTS OF FARM EQUIPMENT were in a downward trend in 1982, but the U.S. improved its trade balance. Imports were down 24 per cent at $1.199 billion while exports were off 19 per cent at $2.378 billion.

Tractor imports declined from 1981's $590.5 million to $505.3 million, mostly in the form of reduction in 40- to 79-hp units from Western Europe. Japanese tractor imports were down from $164.6 million to $154.8 million. Most of the reduced import activity from Japan concerned under-30-hp tractors; imports of over-40-hp tractors from Japan went up.

Tractor parts imports fell about 38 per cent from $297 million to $183 million. Most such parts come from Western Europe. (Source: U.S. Dept. of Commerce, Bureau of Industrial Economics.)

SHIPMENTS OF TIRES FOR TRACTORS AND IMPLEMENTS were cut sharply in 1982 from 4.2 million to 3.2 million units, according to the Rubber Manufacturers Assn. Shipments to equipment manufacturers were off 37 per cent at 1 million units; replacement tire shipments fell less severely--down 13 per cent to 2.1 million units.

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I&T
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## YODER & FREY, INC.
## Archbold, Ohio
## January 10 & 11, 1983

**INTERNATIONAL HARVESTER TRACTORS**

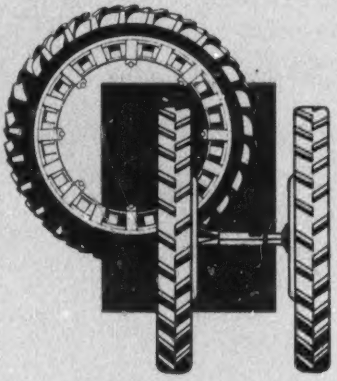
| | |
|---|---|
| Cub, mo., 1954 (Rough) | 1175 |
| Cub, bld., (Fair) | 1375 |
| Cub Loboy, mo., (Fair) | 1700 |
| Cub Loboy, mo., (Rough) | 1650 |
| 185 Loboy, 1940 (Fair) | 340 |
| M, 1950 (Good) | 750* |
| M, 1951 (Good) | 900 |
| M, 1950 (Rough) | 740 |
| Sup.M, 1952 (Good) | 900 |
| Sup.M, 1952 (Fair) | 850 |
| Sup.M, 1952 (Rough) | 875 |
| Sup.C, cult., 1950 (Good) | 1225 |
| 300, ldr., 1957 (Fair) | 1850 |
| 300, 1956 (Rough) | 975 |
| 300, 1956 (Good) | 1300 |
| 300 ldr., 1955 (Good) | 1575 |
| 350 diesel, 1957 (Good) | 1000 |
| 400, 1956 (Rough) | 685 |
| 404, (Rough) | 1600* |
| 450 diesel, 1957 (Rough) | 1100* |
| 454, ldr., 1969 (Fair) | 3950 |
| 460, 1961 (Fair) | 1500 |
| 460, 1961 (Fair) | 1225* |
| 464, (Fair) | 2250* |
| 560, 1960 (Good) | 2450 |
| 560, ldr., 1961 (Good) | 2350 |
| 560 diesel, 1961 (Fair) | 2000* |
| 574 diesel, 1972 (Fair) | 3750 |
| 656 hydro, 1968 (Good) | 3700 |
| 656, 1968 (Good) | 3675 |
| 706, 1962 (Fair) | 2400 |
| 706 diesel, 1965 (Good) | 3300* |
| 706, 1964 (Fair) | 2250* |
| 706, 1964 (Rough) | 2000* |
| 756, 1969 (Fair) | 4300* |
| 766, 1976 (Fair) | 4750* |
| 766, 1974 (Fair) | 4250* |
| 766 diesel, 1975 (Rough) | 8250* |
| 806 diesel cab, 1963 (Good) | 5500 |
| 806 diesel, 1964 (Fair) | 4600 |
| 806 diesel, 1964 (Fair) | 3450* |
| 806 diesel, 1963 (Fair) | 4600* |
| 806, 1965 (Good) | 4125 |
| 806, 1965 (Rough) | 2900* |
| 856 diesel, 1970 (Fair) | 5800* |
| 966 diesel, 1975 (Fair) | 8500 |
| 986, 1981 (Good) | 12,750* |
| 1066, cab, 1975 (Rough) | 6100 |
| 1066, cab, 1975 (Good) | 7000 |
| 1066, 1975 (Fair) | 6800* |
| 1206 diesel, 1964 (Rough) | 4800* |
| 1256 diesel, 1968 (Fair) | 5400* |
| 1456 diesel, 1970 (Fair) | 6000* |
| 1456 diesel, 1969 (Fair) | 5900* |
| 1466 diesel, 1972 (Good) | 7100* |
| 1466 diesel, 1976 (Fair) | 8100* |
| 1468 diesel, 1975 (Fair) | 6250* |
| 1586, 1982 (Excellent) | 23,800 |
| 1586, 1979 (Good) | 13,750 |
| 3388, 1982 (Excellent) | 24,000* |
| 3788, 1981 (Excellent) | 31,000 |
| 4166, 1975 (Fair) | 13,000* |

**FORD TRACTORS**

| | |
|---|---|
| 8N, 1952 (Fair) | 1275 |
| 8N, (Good) | 1350 |
| 8N, 1950 (Rough) | 800* |
| 8N, 1952 (Fair) | 1300 |
| 8N, 1950 (Good) | 1500 |
| 8N, 1952 (Good) | 1300 |
| 8N, ldr., 1945 (Rough) | 1040 |
| 8N, ldr., 1952 (Rough) | 1175* |
| 9N, 1946 (Rough) | 825* |
| 9N, 1943 (Good) | 1150 |
| 9N, 1943 (Rough) | 650 |
| 9N, 1940 (Fair) | 1000* |
| NAA, 1953 (Good) | 1610 |
| 600, 1955 (Fair) | 1525* |
| 600, 1955 (Fair) | 1925 |
| 600, 1956 (Rough) | 1375* |
| 800, ldr., 1957 (Good) | 1775 |
| 800, 1956 (Rough) | 1310* |
| 800, ldr., 1955 (Fair) | 1975 |
| 601, 1955 (Fair) | 1600 |
| 901, 1956 (Fair) | 1700 |
| 2000, 1958 (Good) | 2390 |
| 2000, ldr., 1970 (Fair) | 2800 |
| 3000 diesel, 1969 (Fair) | 2800 |
| 4000, ldr., 1969 (Rough) | 2450* |
| 4000 diesel, 1971 (Rough) | 1825 |
| 4000, 1957 (Rough) | 725 |
| 4000 diesel, (Fair) | 3600 |
| 5000 diesel, 1975 (Good) | 6000 |
| 5000, cab, 1975 (Good) | 6650* |
| 7000 diesel, 1974 (Good) | 6000 |
| 8000 diesel, 1973 (Fair) | 4500* |
| 8000, cab, 1971 (Rough) | 5500* |
| 8600 diesel, 1975 (Fair) | 4500 |
| 8600 diesel, 1975 (Good) | 6900* |
| 9000 diesel, 1972 (Good) | 6300* |
| 9600 diesel, 1975 (Fair) | 6250* |
| 1700 diesel, 1980 (Excellent) | 3400* |
| 4600 diesel, 1977 (Fair) | 6275 |
| 8700, duals, cab, 1977 (Excellent) | 13,375 |
| Jub, 1953 (Rough) | 1450 |
| Jub, 1953 (Fair) | 1500 |
| Jub, 1953 (Rough) | 1360 |
| Jub, 1953 (Rough) | 1225* |
| 9700 diesel, 1977 (Good) | 7900 |
| 9600 diesel, 1975 (Fair) | 5700* |

**FERGUSON & MASSEY FERGUSON**

| | |
|---|---|
| TD-20, ldr., 1969 (Fair) | 3875* |
| TD-30, 1950 (Rough) | 970 |
| 35 diesel, 1964 (Fair) | 1600 |
| 65, 1958 (Rough) | 1300* |
| 85 diesel, 1961 (Rough) | 1235 |
| 135, 1967 (Fair) | 3200 |
| 150 diesel, 1969 (Rough) | 2650 |



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| | |
|---|---|
| 165 diesel, (Good) | 2400 |
| 165 diesel, 1968 (Fair) | 3875 |
| 165 diesel, (Fair) | 2200* |
| 1130 diesel, cab, 1969 (Fair) | 4600* |
| 1130 diesel, cab, 1968 (Fair) | 4150 |
| 1135 diesel, cab, (Fair) | 9200* |
| 1800 diesel, 1974 (Fair) | 8300* |

**WHITE TRACTORS**

| | |
|---|---|
| 2-105 diesel, 1976 (Fair) | 8250* |
| 4-150, (Rough) | 8500* |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| G-1000 diesel, Vista, 1967 (Fair) | 2500* |
| UB, 1949 (Rough) | 550 |
| GV1 | 585 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| B, 1947 (Fair) | 580 |
| G, 1946 (Rough) | 575* |
| 40, 1954 (Fair) | 1100* |
| 50, bld, 1955 (Fair) | 1075 |
| 60, 1953 (Fair) | 750 |
| 70, 1955 (Fair) | 940 |
| 42 diesel, 1958 (Fair) | 1780 |
| 720 diesel, 1957 (Fair) | 1375* |
| 720 diesel, 1958 (Fair) | 1275 |
| 1010 diesel, dozer, (Fair) | 2450 |
| 2510 diesel, (Good) | 4700 |
| 3020, 1967 (Fair) | 3250* |
| 3020, (Good) | 3500 |
| 3020, 1967 (Fair) | 3100* |
| 4010 diesel, 1965 (Fair) | 3250 |
| 4010 diesel, 1963 (Fair) | 4050 |
| 4010 diesel, 1966 (Fair) | 3150 |
| 4010 diesel, 1964 (Fair) | 4700* |
| 4010 diesel, 1964 (Fair) | 3850 |
| 4020 diesel, 1965 (Good) | 6125* |
| 4020, 1967 (Good) | 3850 |
| 4020 diesel, 1967 (Good) | 6500 |
| 4020, 1958 (Fair) | 2300* |
| 4320 diesel, 1969 (Good) | 7700* |
| 4430, duals, cab, 1976 (Fair) | 11,[illegible]00 |
| 4430 diesel, 1978 (Good) | 10,800* |
| 4430, cab, 1977 (Good) | 12,500 |
| 4520, cab, 1970 (Fair) | 6250* |
| 4620 diesel, 1970 (Good) | 8300* |

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| C, 1947 (Fair) | 425 |
| CA, attach., 1950 (Fair) | 650* |
| CA, attach., 1951 (Fair) | 1200 |
| WD, 1950 (Rough) | 600 |
| WD-45, 1952 (Good) | 825 |
| WD-45, 1952 (Rough) | 440 |
| WD-45, 1952 (Good) | 1120 |
| WD-45, 1951 (Fair) | 810 |
| D-15, 1965 (Fair) | 2400 |
| D-15, ldr., 1964 (Fair) | 2000 |
| D-15, 1966 (Fair) | 1200* |
| D-15, 1962 (Rough) | 1250* |
| D-17, 1965 (Fair) | 1175 |
| 190 diesel, 1967 (Good) | 3900* |
| 190XT diesel, 1967 (Rough) | 3200 |
| 190XT, cab, 1972 (Fair) | 5550 |
| 210 diesel, 1973 (Good) | 5400* |
| 220 diesel, (Fair) | 3300* |
| 655, dozer, | 6500 |

**OLIVER TRACTORS**

| | |
|---|---|
| S66, (Fair) | 350 |
| 1600, 1962 (Fair) | 2100 |
| 1755 diesel, cab, (Fair) | 5350* |
| 1855 diesel, 1972 (Good) | 5200* |
| 1950 diesel, 1965 (Rough) | 2300* |
| 1955 diesel, 1972 (Rough) | 4600* |
| 1955 diesel, 1971 (Fair) | 4250 |
| 2150, cab, 1970 (Fair) | 4400* |

**COCKSHUTT TRACTORS**

| | |
|---|---|
| 570, (Good) | 850 |
| 570, (Rough) | 325 |

**CASE TRACTORS**

| | |
|---|---|
| 400, 1958 (Rough) | 1100* |
| 400, 1956 (Rough) | 825* |
| 530, (Good) | 3900* |
| 700, (Fair) | 1075 |
| 730, 1968 (Fair) | 2200 |
| 930 diesel, ldr., 1966 (Rough) | 2300 |
| 870 diesel, cab, 1972 (Fair) | 5650 |
| 930 diesel, 1965 (Fair) | 2425 |
| 930 diesel, cab, 1968 (Fair) | 2750* |
| 930 diesel, 1967 (Good) | 3800* |
| 930, 1966 (Fair) | 2700* |
| 930 diesel, 1967 (Fair) | 2600* |
| 1030, 1968 (Fair) | 2300* |
| 1030 diesel, 1967 (Good) | 3500* |
| 1175 diesel, cab, 1975 (Fair) | 9000* |

## ENLOW AUCTION CO.
## Tulsa, Okla.
## January, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| D-14, 1958 (Fair) | 1200* |
| D-15, 1964 (Good) | 1700* |
| D-19 diesel, 1961 (Fair) | 950 |
| 170 diesel, 1971 (Fair) | 2850 |
| 190 XT diesel, 1970 (Good) | 3700* |

**CASE TRACTORS**

| | |
|---|---|
| 300, 1957 (Good) | 925 |
| 930 diesel, 1962 (Fair) | 3000 |
| 930 diesel, 1963 (Fair) | 3100 |
| 970 diesel, 1972 (Good) | 4200 |
| 1030 diesel, 1966 (Fair) | 3300 |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 885 diesel, ldr., 1975 (Good) | 5225 |
| 990, 1967 (Good) | 2750* |

**FERGUSON TRACTORS**

| | |
|---|---|
| 20, 1948 (Fair) | 750* |
| 20, 1949 (Good) | 1450 |
| 20, 1949 (Good) | 1200* |
| 20, 1950 (Fair) | 800* |
| 20, 1950 (Good) | 1025 |
| 30, 1951 (Rough) | 700 |
| 30, 1952 (Fair) | 850 |
| 30, 1952 (Fair) | 750 |
| 30, 1952 (Good) | 1550 |
| 30, 1953 (Good) | 1275* |

**FORD TRACTORS**

| | |
|---|---|
| 9N, 1940 (Fair) | 700* |
| 9N, 1941 (Good) | 850* |
| 9N, 1941 (Good) | 1000 |
| 9N, 1942 (Fair) | 700* |
| 9N, 1943 (Good) | 1325 |
| 9N, 1943 (Fair) | 900* |
| 9N, 1944 (Good) | 1425 |
| 9N, 1944 (Rough) | 650 |
| 9N, 1944 (Good) | 1200* |
| 9N, 1945 (Good) | 1050 |
| 9N, 1946 (Fair) | 975* |
| 9N, 1946 (Fair) | 1100 |
| 9N, 1947 (Good) | 1350 |
| 9N, 1947 (Good) | 1025 |
| 8N, 1947 (Good) | 1300 |
| 8N, 1947 (Good) | 1250 |
| 8N, 1948 (Excellent) | 1375 |
| 8N, 1948 (Fair) | 1200* |
| 8N, 1948 (Good) | 1425 |
| 8N, 1949 (Good) | 1575 |
| 8N, 1949 (Good) | 1500 |
| 8N, 1950 (Good) | 1575 |
| 8N, 1950 (Good) | 1400 |
| 8N, 1951 (Good) | 1400 |
| 8N, 1951 (Fair) | 1125 |
| 8N, 1952 (Good) | 1825 |
| 8N, 1952 (Fair) | 1125 |
| 8N, 1952 (Good) | 1250 |
| 8N, 1952 (Fair) | 1200 |
| 8N, 1952 (Excellent) | 1950 |
| NAA, 1953 (Fair) | 1350* |
| NAA, 1953 (Good) | 2000 |
| NAA, 1953 (Excellent) | 2550 |
| NAA, 1953 (Fair) | 1625 |
| NAA, 1953 (Good) | 2200 |
| NAA, 1953 (Good) | 1900 |
| NAA, 1953 (Good) | 1800* |

*(More...)*

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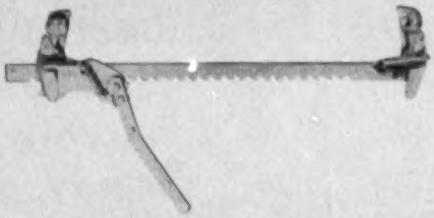

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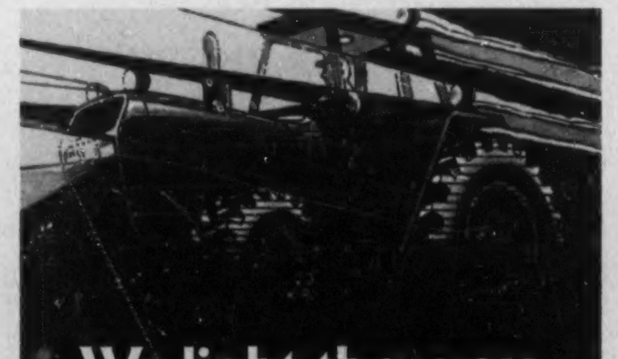

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## Auctions
*(continued)*

| | |
|---|---|
| NAA, 1953 (Excellent) | 2625 |
| 600, 1954 (Fair) | 1700* |
| 800, 1955 (Good) | 2100 |
| 600, 1955 (Good) | 2225 |
| 600, 1955 (Good) | 1950* |
| 630, 1956 (Good) | 2650 |
| 640, 1956 (Good) | 2150* |
| 640, 1956 (Fair) | 1600* |
| 640, 1957 (Good) | 1975* |
| 641, 1957 (Good) | 2025 |
| 800, 1954 (Fair) | 1700 |
| 800, 1955 (Good) | 1950* |
| 850, 1955 (Good) | 2100 |
| 850, ldr., 1956 (Good) | 2350 |
| 860, 1957 (Good) | 2525 |
| 860, 1957 (Good) | 2350 |
| 801, 1956 (Fair) | 1890* |
| 861, 1956 (Good) | 2000* |
| 861, 1960 (Good) | 2225* |
| 861, 1960 (Good) | 2950 |
| 960, 1955 (Good) | 1250* |
| 901, 1956 (Good) | 1175* |
| Fordson diesel, 1957 (Fair) | 950* |
| 2000, 1962 (Good) | 2800 |
| 2000, 1964 (Good) | 2900 |
| 4000, Select-O-Speed, 1962 (Good) | 1400* |
| 4400 diesel, backhoe, 1966 (Good) | 4850 |
| 4500 ldr., 1968 (Rough) | 2200 |
| 5000 diesel, 1965 (Fair) | 3150* |
| 5000 diesel, 1966 (Good) | 3650 |
| 7000 diesel, 1969 (Fair) | 4550 |
| 9600 diesel, 1977 (Good) | 6300* |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Cub, 1956 (Fair) | 825 |
| Cub, mo., 1958 (Good) | 1525 |
| H, 1952 (Good) | 675 |
| 240 diesel, 1962 (Good) | 2100 |
| B-414, 1964 (Fair) | 1050* |
| 624 diesel, 1967 (Fair) | 1800* |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| MT, 1949 (Fair) | 490* |
| B, 1946 (Good) | 500 |
| 40, 1954 (Good) | 875 |
| 50, 1955 (Good) | 1050 |
| 70 diesel, 1955 (Good) | 1250* |
| 2010, backhoe, 1963 (Good) | 4000 |
| 3010 diesel, 1961 (Fair) | 2900 |
| 2020 diesel, 1969 (Good) | 4500 |
| 2020, ldr., 1970 (Good) | 4900 |
| 4020 diesel, 1966 (Good) | 4800* |
| 4020, 1966 (Good) | 3000 |
| 4020 diesel, 1967 (Good) | 4700* |
| 1530 diesel, 1975 (Good) | 4850* |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 35, 1960 (Fair) | 1850* |
| 35, 1960 (Good) | 2100* |
| 35 diesel, 1961 (Good) | 2500 |
| 35 diesel, 1961 (Fair) | 1900* |
| 35 diesel, 1962 (Good) | 2850 |
| 35, 1962 (Good) | 2200* |
| 35 diesel, 1962 (Good) | 2350* |
| 35, 1963 (Fair) | 1850* |
| 35 diesel, 4-cyl., 1963 (Fair) | 1225 |
| 50, 1962 (Good) | 2400 |
| 50, 1963 (Good) | 2600 |
| 50, 1963 (Fair) | 1790* |
| 65 diesel, 1960 (Fair) | 2050* |
| 65, 1960 (Good) | 2230* |
| 65, 1961 (Good) | 2300 |
| 65 diesel, 1961 (Good) | 2875 |
| 65, 1961 (Fair) | 1775* |
| 65 diesel, 1962 (Good) | 2275* |
| 65, 1962 (Fair) | 1950* |
| 65 diesel, 1963 (Good) | 2650 |
| 65 diesel, 1963 (Good) | 2350* |
| 135 diesel, 1965 (Good) | 3250* |
| 135, 1966 (Good) | 3050 |
| 165 diesel, 1965 (Good) | 3250* |
| 165 diesel, 1966 (Fair) | 2580* |
| 165 diesel, 1966 (Fair) | 2750 |
| 165 diesel, 1967 (Good) | 3800 |
| 165, 1967 (Good) | 2600 |
| 165 diesel, 1969 (Fair) | 2950* |
| 165 diesel, 1970 (Good) | 3400 |
| 175 diesel, 1966 (Fair) | 3000* |
| 175 diesel, 1968 (Good) | 3950* |
| 175 diesel, 1972 (Good) | 4550* |
| 245 diesel, (New) | 8450 |
| 245 diesel, (New) | 8150 |
| 255 diesel, 1976 (Fair) | 4250 |
| 285 diesel, 1977 (Good) | 6500* |
| 285 diesel, cab, 1977 (Good) | 7500 |
| 1080 diesel, 1969 (Good) | 4300 |
| 1105 diesel, cab, 1975 (Good) | 8550* |
| 1155 diesel, cab, 1975 (Good) | 7900* |

**OLIVER TRACTOR**

| | |
|---|---|
| S-55, 1957 (Good) | 1350 |

**NOTES**

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.

GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.

FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.

ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.

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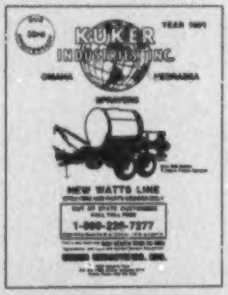

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# RED BOOK

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Nebraska test reports
Full contents page A2

March 31, 1983 • Vol. 98 • No. 5

**Implement & Tractor**

*The business magazine of the farm and industrial equipment industry*

# 67th annual RED BOOK issue

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***Abbreviations:***
**DNA**—Does not apply.
**NA**—Not available.
**Std.**—Standard.
**Opt.**—Optional
Linear measurements may be to nearest ¼-inch.

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# The Nebraska Tractor Test Law

**Purpose of the Law**—The Nebraska Tractor Test Law originated in 1919 for the purpose of verifying advertising claims on tractors offered for sale to Nebraska farmers.

Its position as the only independent test laboratory in the United States devoted to the evaluation of tractor performance proved of unique value to the industry. The Agricultural Tractor Test Code used in the Nebraska Tests was developed with the approval and assistance of the American Society of Agricultural Engineers and the Society of Automotive Engineers, and is revised and updated periodically as the need arises. The Test Code (ASAE S209.4 or SAE J708c) is published in the ASAE Yearbook and SAE Handbook.

**Provisions of the Law**—Stated briefly, the Nebraska Tractor Test Law provides:

That a stock unit of each agricultural tractor model sold in Nebraska shall be tested and passed upon by a board of three engineers under the supervision and direction of the University of Nebraska. Each tractor must be certified as a stock model and will be equipped with the common power consuming accessories. An official representative of the manufacturer is present during the test to see that the performance meets company standards.

The Department of Agriculture shall deny to any manufacturer the right to do business in the State on complaint of two or more bona fide customers that the company has failed to maintain an adequate service station with a full supply of replacement parts within the state and within reasonable distance of customers.

The law further states that it shall be unlawful to publish excerpts from any official test in advertising material without publishing the entire report.

The provisions of the Nebraska Test Law do not apply to any tractor the engine of which develops less than 20 horsepower; or to tractors manufactured, sold and used for heavy construction when identical units are not sold and used for agricultural purposes.

# Explanation of Test Report

### General

Tractors are tested at the University of Nebraska according to the Agricultural Tractor Test Code approved by the American Society of Agricultural Engineers and the Society of Automotive Engineers or official Nebraska test procedure.

The manufacturer selects the tractor to be tested and certifies that it is a stock model. Each tractor is equipped with the common power consuming accessories such as power steering, power lift pump, generator, etc., if available. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operating station. An official representative of the company is present during the test to see that the tractor gives its optimum performance. Additional weight may be added to the tractor as ballast if the manufacturer recommends use of such ballast. The static tire loads and the tire inflation pressures must conform to the specifications of Tire and Rim Association.

### Preparation for Test

The engine crankcase is drained and refilled with new oil conforming to specifications in the operator's manual. The operator's manual is also used as the guide for selecting the proper fuel and for routine lubrication and maintenance operations.

The tractor is limbered up for a minimum of three hours on the drawbar. Preliminary adjustment of the tractor is permitted at this time. Any parts added or replaced during the limber-up run, or any subsequent runs, are mentioned in the individual test reports. The tractor is equipped with approximately the amount of added ballast that is to be used during the drawbar runs.

### PTO Performance

Power take-off performance runs are made by connecting the power take-off to a dynamometer. During a preliminary power take-off run the manufacturer's representative may make adjustment for the fuel, ignition or injection timing and governor control settings. These settings must be maintained for the remainder of the test. The manually operated governor control mechanism is set to provide the high-idle speed specified by the manufacturer. During the power take-off runs an ambient air temperature of approximately 75°F. (24.0°C) is maintained.

Maximum power is obtained at the rated engine speed specified by the manufacturer with the governor control lever set for maximum power. This same setting is used for all subsequent PTO runs. Time of the run is two hours. Whenever the power take-off speed during the maximum power run differs from the speeds set forth in the ASAE and SAE standards, an additional run is made at either 540 or 1000 rpm of the power take-off shaft. Time of this run is one hour.

### Drawbar Performance

Maximum drawbar power is shown for the normal field speed selected by the manufacturer. All engine adjustments are the same as those used in the power take-off runs. If the manufacturer specifies a different rated engine speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified.

Maximum drawbar power is determined within the following limits: (1) slip of the drivers must not exceed 15% for pneumatic tires on the concrete test course or 7% for steel cleats on the well packed earthen test course, (2) ground speeds must not exceed 10 miles per hour, (3) safe stability limits of the tractor must not be exceeded, (4) no other operating limit of the tractor must be exceeded. Drawbar load is applied until the manufacturer's rated engine speed is obtained with maximum governor control lever setting. Travel speed, drawbar pull and other data are recorded over two 500-foot straight level areas.

Fuel consumption is determined at the manufacturer's selected travel speed with the drawbar pull set: (1) to give rated engine rpm, (2) 75% of the pull at rated engine rpm, (3) 50% of the pull at rated engine rpm, and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

This summary shows the drawbar horsepower, corresponding travel speed and fuel consumption at 100%, 75% or 50% loads, and 50% of pull at reduced engine speed.

Also shown is the maximum drawbar horsepower produced for two 500-foot travel sections and corresponding travel speed, the maximum drawbar pull and the corresponding drive-wheel slippage.

In addition, the "lugging ability" obtained by increasing the load so that the full throttle engine speed drops to 80% of rated is given as a percent increase with respect to the pull at rated engine rpm.

The maximum drawbar horsepower and the corresponding speed and drawbar pull for other selected gears or travel speeds are shown in the individual test reports.

### Sound Measurement

Sound is recorded during each of the Drawbar Performance runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet (7.5 m) from the line of travel of the tractor. An increase of 10dB(A) will approximately double the loudness to the human ear.

Individual copies of any test report, annual summary booklets or annual subscription (at $4.50) are available. For complete information write to **Department of Agricultural Engineering, Univ. of Nebraska—Lincoln, Lincoln, NE 68583.**

# NEBRASKA TRACTOR TEST 1401
# STEIGER COUGAR III ST-280 CUMMINS DIESEL
# 20 SPEED

## DRAWBAR PERFORMANCE AT 2100 RPM

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 12th Gear** | | | | | | | | | | | |
| 228.81<br>*(170.62)* | 12455<br>*(55.40)* | 6.89<br>*(11.09)* | 2099 | 2.71 | 15.723<br>*(59.516)* | 0.473<br>*(0.288)* | 14.55<br>*(2.867)* | 171<br>*(76.9)* | 54<br>*(11.9)* | 60<br>*(15.3)* | 28.880<br>*(97.523)* |
| **75% of Pull at Maximum Power—Ten Hours 12th Gear** | | | | | | | | | | | |
| 189.62<br>*(141.40)* | 9658<br>*(42.96)* | 7.36<br>*(11.85)* | 2230 | 2.12 | 14.365<br>*(54.376)* | 0.522<br>*(0.317)* | 13.20<br>*(2.600)* | 171<br>*(76.9)* | 62<br>*(16.4)* | 70<br>*(20.8)* | 28.798<br>*(97.247)* |
| **50% of Pull at Maximum Power—Two Hours 12th Gear** | | | | | | | | | | | |
| 129.78<br>*(96.78)* | 6442<br>*(28.66)* | 7.55<br>*(12.16)* | 2277 | 1.55 | 11.747<br>*(44.466)* | 0.623<br>*(0.379)* | 11.05<br>*(2.176)* | 168<br>*(75.3)* | 66<br>*(18.6)* | 73<br>*(22.8)* | 28.925<br>*(97.675)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 16th Gear** | | | | | | | | | | | |
| 130.46<br>*(97.29)* | 6452<br>*(28.70)* | 7.58<br>*(12.20)* | 1382 | 1.66 | 8.842<br>*(33.469)* | 0.467<br>*(0.284)* | 14.76<br>*(2.907)* | 170<br>*(76.4)* | 68<br>*(20.0)* | 77<br>*(24.7)* | 28.940<br>*(97.726)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 197.47<br>*(147.25)* | 31517<br>*(140.19)* | 2.35<br>*(3.78)* | 2161 | 14.85 | 4th Gear | 169<br>*(76.1)* | 59<br>*(15.0)* | 61<br>*(16.1)* | 28.870<br>*(97.490)* |
| 220.46<br>*(164.40)* | 29827<br>*(132.68)* | 2.77<br>*(4.46)* | 2099 | 9.61 | 5th Gear | 170<br>*(76.7)* | 61<br>*(16.1)* | 65<br>*(18.3)* | 28.880<br>*(97.523)* |
| 227.18<br>*(169.41)* | 26568<br>*(118.18)* | 3.21<br>*(5.16)* | 2099 | 7.30 | 6th Gear | 172<br>*(77.5)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.820<br>*(97.321)* |
| 229.11<br>*(170.85)* | 23393<br>*(104.06)* | 3.67<br>*(5.91)* | 2099 | 5.79 | 7th Gear | 172<br>*(77.5)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.820<br>*(97.321)* |
| 233.55<br>*(174.16)* | 20949<br>*(93.19)* | 4.18<br>*(6.73)* | 2099 | 4.79 | 8th Gear | 171<br>*(77.2)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.830<br>*(97.355)* |
| 236.39<br>*(176.27)* | 18706<br>*(83.21)* | 4.74<br>*(7.63)* | 2099 | 4.24 | 9th Gear | 172<br>*(77.8)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.840<br>*(97.388)* |
| 236.82<br>*(176.60)* | 16530<br>*(73.53)* | 5.37<br>*(8.65)* | 2100 | 3.52 | 10th Gear | 173<br>*(78.3)* | 62<br>*(16.7)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |
| 236.43<br>*(176.31)* | 14552<br>*(64.73)* | 6.09<br>*(9.81)* | 2100 | 3.12 | 11th Gear | 173<br>*(78.3)* | 60<br>*(15.6)* | 70<br>*(21.1)* | 28.860<br>*(97.456)* |
| 235.61<br>*(175.69)* | 12832<br>*(57.08)* | 6.89<br>*(11.08)* | 2098 | 2.63 | 12th Gear | 173<br>*(78.3)* | 59<br>*(15.0)* | 67<br>*(19.4)* | 28.860<br>*(97.456)* |
| 233.27<br>*(173.95)* | 10963<br>*(48.77)* | 7.98<br>*(12.84)* | 2099 | 2.30 | 13th Gear | 173<br>*(78.3)* | 60<br>*(15.6)* | 68<br>*(20.0)* | 28.860<br>*(97.456)* |
| 232.67<br>*(173.50)* | 9672<br>*(43.03)* | 9.02<br>*(14.52)* | 2100 | 1.97 | 14th Gear | 173<br>*(78.3)* | 61<br>*(16.1)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |

## LUGGING ABILITY IN 12th GEAR

| Crankshaft Speed rpm | 2098 | 1889 | 1678 | 1468 | 1257 | 1056 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 12832<br>*(57.08)* | 15482<br>*(68.87)* | 17542<br>*(78.03)* | 19145<br>*(85.16)* | 18673<br>*(83.06)* | 16873<br>*(75.05)* |
| Increase in Pull % | 0 | 21 | 37 | 49 | 40 | 31 |
| Power—Hp *(kW)* | 235.61<br>*(175.69)* | 254.55<br>*(189.81)* | 254.73<br>*(189.95)* | 242.26<br>*(180.65)* | 202.46<br>*(150.98)* | 154.31<br>*(115.07)* |
| Speed—Mph *(km/h)* | 6.89<br>*(11.08)* | 6.17<br>*(9.92)* | 5.45<br>*(8.76)* | 4.75<br>*(7.64)* | 4.07<br>*(6.54)* | 3.43<br>*(5.52)* |
| Slip % | 2.63 | 3.20 | 3.84 | 4.32 | 4.16 | 3.84 |

| TRACTOR SOUND LEVEL WITH CAB | 1700 RPM dB(A) | 2100RPM dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 78.0 | 79.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 79.0 |
| 50% of Pull at Maximum Power—Two Hours | | 79.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 78.0 |
| Bystander in 20th gear | | 103.5 |

**Department of Agricultural Engineering**

**Dates of Test:** August 27 to September 9, 1981

**Manufacturer:** STEIGER TRACTOR, INC.,
1701 Westview Drive, Fargo, North Dakota
58103

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8269 **Fuel weight** 6.885 lbs/gal *(0.825 kg/l)* **Oil SAE** 15W-40 **API service classification** CD CC SE **To motor** 7.850 gal *(29.717 l)* **Drained from motor** 7.322 gal *(27.717 l)* **Transmission and hydraulic lubricant** SAE 10 hydraulic oil **Final drive lubricant** SAE 85W90 **Total time engine was operated** 52.0 hours.

**ENGINE:** **Make** Cummins Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 10972835 **Crankshaft** lengthwise **Rated rpm** 1700 to 2100 **Bore and stroke** 5.5" × 6.0" *(139.7 mm × 152.4 mm)* **Compression ratio** 14.1 to 1 **Displacement** 855 cu in *(14013 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic oil, radiator for transmission and transfer case oil **Fuel filter** two paper cartridges **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** four wheel dirve with duals **Serial No.** 110-00026 81 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 128" *(3251 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 76.9" *(1953 mm)* Vertical distance above roadway 45.4" *(1153 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.8 *(2.9)* second 2.0 *(3.3)* third 2.3 *(3.7)* fourth 2.6 *(4.2)* fifth 3.0 *(4.8)* sixth 3.3 *(5.4)* seventh 3.8 *(6.1)* eighth 4.2 *(6.8)* ninth 4.8 *(7.7)* tenth 5.4 *(8.6)* eleventh 6.1 *(9.8)* twelfth 6.8 *(11.0)* thirteenth 7.9 *(12.7)* fourteenth 8.8 *(14.2)* fifteenth 10.1 *(16.2)* sixteenth 11.3 *(18.1)* seventeenth 12.6 *(20.3)* eighteenth 14.1 *(22.7)* nineteenth 16.0 *(25.8)* twentieth 17.9 *(28.8)* reverse 1.8 *(2.9)*, 2.0 *(3.3)*, 2.3 *(3.7)*, 2.6 *(4.1)* **Clutch** dual dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 279" *(7.09 m)* left 278" *(7.06 m)* **Turning space diameter** (on concrete surface without brake) right 583" *(14.80 m)* left 581" *(14.76 m)* **Power take-off** none.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

## DRAWBAR PERFORMANCE AT 1700 RPM

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 12th Gear** | | | | | | | | | | | |
| 249.68<br>*(186.19)* | 16962<br>*(75.45)* | 5.52<br>*(8.88)* | 1700 | 3.64 | 15.541<br>*(58.829)* | 0.429<br>*(0.261)* | 16.07<br>*(3.165)* | 176<br>*(79.7)* | 57<br>*(13.9)* | 65<br>*(18.1)* | 28.890<br>*(97.557)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 225.35<br>*(168.04)* | 31335<br>*(139.38)* | 2.70<br>*(4.34)* | 1700 | 14.60 | 7th Gear | 173<br>*(78.3)* | 63<br>*(17.2)* | 67<br>*(19.4)* | 28.890<br>*(97.557)* |
| 241.09<br>*(179.78)* | 27610<br>*(122.82)* | 3.27<br>*(5.27)* | 1701 | 8.18 | 8th Gear | 175<br>*(79.4)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.830<br>*(97.355)* |
| 248.21<br>*(185.09)* | 24789<br>*(110.27)* | 3.75<br>*(6.04)* | 1700 | 6.17 | 9th Gear | 175<br>*(79.4)* | 61<br>*(16.1)* | 70<br>*(21.1)* | 28.840<br>*(97.388)* |
| 252.78<br>*(188.50)* | 22169<br>*(98.61)* | 4.28<br>*(6.88)* | 1699 | 5.25 | 10th Gear | 175<br>*(79.4)* | 62<br>*(16.7)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |
| 255.17<br>*(190.28)* | 19645<br>*(87.39)* | 4.87<br>*(7.84)* | 1701 | 4.39 | 11th Gear | 177<br>*(80.6)* | 61<br>*(16.1)* | 71<br>*(21.7)* | 28.860<br>*(97.456)* |
| 255.77<br>*(190.73)* | 17390<br>*(77.35)* | 5.52<br>*(8.88)* | 1699 | 3.76 | 12th Gear | 176<br>*(80.0)* | 60<br>*(15.6)* | 68<br>*(20.0)* | 28.860<br>*(97.456)* |
| 256.45<br>*(191.23)* | 15003<br>*(66.74)* | 6.41<br>*(10.32)* | 1701 | 3.04 | 13th Gear | 177<br>*(80.3)* | 60<br>*(15.6)* | 69<br>*(20.6)* | 28.860<br>*(97.456)* |
| 255.66<br>*(190.64)* | 13233<br>*(58.86)* | 7.25<br>*(11.66)* | 1700 | 2.79 | 14th Gear | 177<br>*(80.3)* | 61<br>*(16.1)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |
| 254.00<br>*(189.41)* | 11612<br>*(51.65)* | 8.20<br>*(13.20)* | 1698 | 2.47 | 15th Gear | 176<br>*(80.0)* | 61<br>*(16.1)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 80 lb *(36 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each inner) | 1152 lb *(523 kg)* | None |
| | —Cast Iron (each) | None | None |
| Height of Drawbar | | 18.5 in *(470 mm)* | 18.5 in *(470 mm)* |
| Static Weight with Operator—Rear | | 12820 lb *(5815 kg)* | 12500 lb *(5670 kg)* |
| Front | | 20285 lb *(9201 kg)* | 17980 lb *(8156 kg)* |
| Total | | 33105 lb *(15016 kg)* | 30480 lb *(13826 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 133°F *(56.1°C)* Eleven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1401.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**Steiger Cougar III ST-280 Cummins Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1402
# STEIGER COUGAR III PTA 280 CUMMINS DIESEL
# 10 SPEED

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th (4L) Gear** | | | | | | | | | | | |
| 217.04<br>*(161.85)* | 14679<br>*(65.30)* | 5.54<br>*(8.92)* | 2099 | 2.97 | 15.795<br>*(59.791)* | 0.501<br>*(0.305)* | 13.74<br>*(2.707)* | 174<br>*(78.6)* | 74<br>*(23.1)* | 85<br>*(29.2)* | 28.970<br>*(97.827)* |
| **75% of Pull at Maximum Power—Ten Hours 5th (4L) Gear** | | | | | | | | | | | |
| 176.96<br>*(131.96)* | 11397<br>*(50.70)* | 5.82<br>*(9.37)* | 2187 | 2.23 | 14.114<br>*(53.427)* | 0.549<br>*(0.334)* | 12.54<br>*(2.470)* | 170<br>*(76.8)* | 62<br>*(16.8)* | 74<br>*(23.1)* | 29.083<br>*(98.209)* |
| **50% of Pull at Maximum Power—Two Hours 5th (4L) Gear** | | | | | | | | | | | |
| 121.11<br>*(90.31)* | 7623<br>*(33.91)* | 5.96<br>*(9.59)* | 2221 | 1.49 | 11.601<br>*(43.916)* | 0.660<br>*(0.401)* | 10.44<br>*(2.056)* | 169<br>*(76.1)* | 65<br>*(18.3)* | 78<br>*(25.6)* | 28.930<br>*(97.692)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th (2H) Gear** | | | | | | | | | | | |
| 122.06<br>*(91.02)* | 7686<br>*(34.19)* | 5.96<br>*(9.58)* | 1539 | 1.32 | 8.769<br>*(33.195)* | 0.495<br>*(0.301)* | 13.92<br>*(2.742)* | 170<br>*(76.7)* | 67<br>*(19.2)* | 84<br>*(28.9)* | 28.885<br>*(97.540)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 149.78<br>*(111.69)* | 32625<br>*(145.12)* | 1.72<br>*(2.77)* | 2187 | 14.82 | 1st (1L) Gear | | | 171<br>*(76.9)* | 61<br>*(16.1)* | 68<br>*(20.0)* | 28.930<br>*(97.692)* |
| 214.86<br>*(160.22)* | 23861<br>*(106.14)* | 3.38<br>*(5.43)* | 2099 | 5.72 | 2nd (2L) Gear | | | 173<br>*(78.3)* | 73<br>*(22.8)* | 83<br>*(28.3)* | 28.940<br>*(97.726)* |
| 211.67<br>*(157.84)* | 18476<br>*(82.19)* | 4.30<br>*(6.91)* | 2101 | 3.77 | 3rd (1H) Gear | | | 174<br>*(78.6)* | 73<br>*(22.8)* | 84<br>*(28.9)* | 28.940<br>*(97.726)* |
| 220.36<br>*(164.32)* | 19015<br>*(84.58)* | 4.35<br>*(6.99)* | 2101 | 3.93 | 4th (3L) Gear | | | 173<br>*(78.3)* | 73<br>*(22.8)* | 84<br>*(28.9)* | 28.940<br>*(97.726)* |
| 224.92<br>*(167.72)* | 15215<br>*(67.68)* | 5.54<br>*(8.92)* | 2099 | 2.97 | 5th (4L) Gear | | | 173<br>*(78.3)* | 73<br>*(22.8)* | 84<br>*(28.9)* | 28.940<br>*(97.726)* |
| 220.54<br>*(164.46)* | 11818<br>*(52.57)* | 7.00<br>*(11.26)* | 2099 | 2.31 | 6th (5L) Gear | | | 173<br>*(78.3)* | 73<br>*(22.8)* | 83<br>*(28.3)* | 28.940<br>*(97.726)* |
| 216.30<br>*(161.30)* | 10025<br>*(44.59)* | 8.09<br>*(13.02)* | 2099 | 1.82 | 7th (2H) Gear | | | 173<br>*(78.3)* | 73<br>*(22.8)* | 82<br>*(27.8)* | 28.940<br>*(97.726)* |

## LUGGING ABILITY IN 5th (4L) GEAR

| Crankshaft Speed rpm | 2099 | 1885 | 1675 | 1464 | |
|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 15215<br>*(67.68)* | 18512<br>*(82.35)* | 21495<br>*(95.62)* | 23671<br>*(105.29)* | At 1410 RPM the automatic transmission shifted down |
| Increase in Pull % | 0 | 22 | 41 | 56 | to 4th (3L) gear and the test |
| Power—Hp *(kW)* | 224.92<br>*(167.72)* | 243.56<br>*(181.63)* | 249.05<br>*(185.71)* | 237.62<br>*(177.19)* | was terminated. |
| Speed—Mph *(km/h)* | 5.54<br>*(8.92)* | 4.93<br>*(7.94)* | 4.34<br>*(6.99)* | 3.76<br>*(6.06)* | |
| Slip % | 2.97 | 3.93 | 4.71 | 5.64 | |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 75.5 |
| 75% of Pull at Maximum Power—Ten Hours | 75.5 |
| 50% of Pull at Maximum Power—Two Hours | 75.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 74.5 |
| Bystander in 10th (5H) Gear | 104.0 |

**Department of Agricultural Engineering**

**Dates of Test:** August 27 to September 10, 1981

**Manufacturer:** STEIGER TRACTOR, INC., 1701 Westview Drive, Fargo, North Dakota 58103

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8269 **Fuel weight** 6.885 lbs/gal *(0.825 kg/l)* **Oil SAE** 15W-40 **API service classification** CD CC SE **To motor** 7.713 gal *(29.198 l)* **Drained from motor** 6.394 gal *(24.206 l)* **Transmission lubricant** hydraulic transmission fluid type C-3 (Dextron) **Transfer case lubricant** 303 or equivalent **Hydraulic oil** SAE 10 hydraulic oil, 303 or equivalent **Final drive lubricant** SAE 85W90 **Total time engine was operated** 34.5 hours.

**ENGINE: Make** Cummins Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 10972845 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.5" × 6.0" *(139.7 mm × 152.4 mm)* **Compression ratio** 14.1 to 1 **Displacement** 855 cu in *(14013 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** separate engine coolant heat exchangers for crankcase oil and transmission oil, separate radiators for hydraulic and transfer case oil **Fuel filter** two paper cartridges **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** four wheel dirve with duals **Serial No.** 154-00034 81 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 132.5" *(3365 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 76.9" *(1953 mm)* Vertical distance above roadway 45.5" *(1156 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with automatic powershift and torque converter lockup **Advertised speeds mph** *(km/h)* first 1.9 *(3.0)* second 3.4 *(5.6)* third 4.3 *(6.9)* fourth 4.4 *(7.0)* fifth 5.5 *(8.9)* sixth 6.9 *(11.1)* seventh 7.9 *(12.8)* eighth 10.0 *(16.2)* ninth 12.7 *(20.4)* tenth 15.9 *(25.6)* reverse 2.4 *(3.8)*, 5.4 *(8.7)* **Clutch** none **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 245" *(6.22 m)* left 257" *(6.53 m)* **Turning space diameter** (on concrete surface without brake) right 513" *(13.03 m)* left 537" *(13.64 m)* **Power take-off** none.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

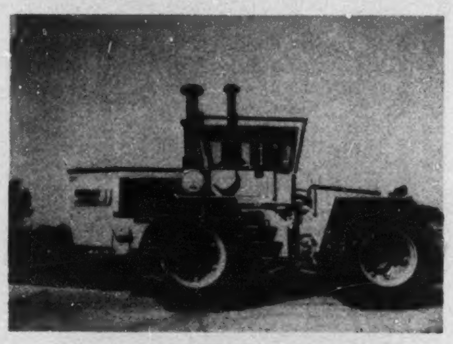
| **TIRES, BALLAST AND WEIGHT** | | **With Ballast** | **Without Ballast** |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 155 lb *(70 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each inner) | 1138 lb *(516 kg)* | None |
| | —Cast Iron (each) | None | None |
| Height of Drawbar | | 18.5 in *(470 mm)* | 18.5 in *(470 mm)* |
| Static Weight with Operator—Rear | | 13640 lb *(6187 kg)* | 13020 lb *(5906 kg)* |
| Front | | 20035 lb *(9088 kg)* | 17760 lb *(8056 kg)* |
| Total | | 33675 lb *(15275 kg)* | 30780 lb *(13962 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE, ASAE and ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at injection pump was maintained 135°F *(56.1°C)*. Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1402.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Steiger Cougar III PTA 280 Cummins Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1404—DEUTZ DX-130 DIESEL 24 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1110 rpm)** | | | | | | | | |
| 121.27<br>*(90.43)* | 2300 | 7.313<br>*(27.683)* | 0.423<br>*(0.257)* | 16.58<br>*(3.267)* | air<br>cooled | 59<br>*(15.0)* | 75<br>*(23.8)* | 29.290<br>*(98.908)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 121.36<br>*(90.50)* | 2071 | 6.884<br>*(26.059)* | 0.398<br>*(0.242)* | 17.63<br>*(3.473)* | air<br>cooled | 58<br>*(14.4)* | 75<br>*(23.9)* | 29.280<br>*(98.874)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 105.11<br>*(78.38)* | 2345 | 6.524<br>*(24.696)* | 0.435<br>*(0.265)* | 16.11<br>*(3.174)* | air<br>cooled | 58<br>*(14.4)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2478 | 1.845<br>*(6.984)* | .....<br>..... | .....<br>..... | air<br>cooled | 58<br>*(14.4)* | 75<br>*(23.9)* | ......<br>...... |
| 53.53<br>*(39.92)* | 2390 | 4.118<br>*(15.588)* | 0.539<br>*(0.328)* | 13.00<br>*(2.561)* | air<br>cooled | 57<br>*(13.6)* | 74<br>*(23.1)* | ......<br>...... |
| 121.10<br>*(90.30)* | 2300 | 7.307<br>*(27.660)* | 0.423<br>*(0.257)* | 16.57<br>*(3.265)* | air<br>cooled | 59<br>*(14.7)* | 78<br>*(25.3)* | ......<br>...... |
| 27.41<br>*(20.44)* | 2454 | 2.932<br>*(11.099)* | 0.750<br>*(0.456)* | 9.35<br>*(1.842)* | air<br>cooled | 58<br>*(14.2)* | 76<br>*(24.4)* | ......<br>...... |
| 79.63<br>*(59.38)* | 2366 | 5.372<br>*(20.335)* | 0.473<br>*(0.288)* | 14.82<br>*(2.920)* | air<br>cooled | 58<br>*(14.4)* | 76<br>*(24.4)* | ......<br>...... |
| **Av** 64.46<br>**Av** *(48.07)* | 2385 | 4.683<br>*(17.727)* | 0.509<br>*(0.310)* | 13.77<br>*(2.712)* | air<br>cooled | 58<br>*(14.3)* | 76<br>*(24.2)* | 29.277<br>*(98.863)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 15th (3MH) Gear** | | | | | | | | | | | |
| 102.63<br>*(76.53)* | 6460<br>*(28.73)* | 5.96<br>*(9.59)* | 2300 | 4.95 | 7.260<br>*(27.480)* | 0.496<br>*(0.302)* | 14.14<br>*(2.785)* | air<br>cooled | 51<br>*(10.6)* | 65<br>*(18.3)* | 29.330<br>*(99.040)* |
| **75% of Pull at Maximum Power—Ten Hours 15th (3MH) Gear** | | | | | | | | | | | |
| 83.15<br>*(62.00)* | 4985<br>*(22.17)* | 6.25<br>*(10.07)* | 2380 | 3.62 | 6.346<br>*(24.023)* | 0.535<br>*(0.325)* | 13.10<br>*(2.581)* | air<br>cooled | 52<br>*(11.2)* | 64<br>*(18.0)* | 29.220<br>*(98.672)* |
| **50% of Pull at Maximum Power—Two Hours 15th (3MH) Gear** | | | | | | | | | | | |
| 56.86<br>*(42.40)* | 3335<br>*(14.84)* | 6.39<br>*(10.29)* | 2407 | 2.51 | 5.048<br>*(19.108)* | 0.622<br>*(0.378)* | 11.26<br>*(2.219)* | air<br>cooled | 54<br>*(11.9)* | 62<br>*(16.7)* | 28.890<br>*(97.557)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 20th (2HH) Gear** | | | | | | | | | | | |
| 56.69<br>*(42.27)* | 3326<br>*(14.80)* | 6.39<br>*(10.28)* | 1455 | 2.45 | 3.835<br>*(14.517)* | 0.474<br>*(0.288)* | 14.78<br>*(2.912)* | air<br>cooled | 61<br>(16.1) | 74<br>(23.1) | 28.870<br>(97.490) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 94.03<br>*(70.12)* | 14406<br>*(64.08)* | 2.45<br>*(3.94)* | 2362 | 14.82 | 6th (1ML) Gear | | | air<br>cooled | 49<br>*(9.4)* | 55<br>*(12.8)* | 28.910<br>*(97.620)* |
| 98.31<br>*(73.31)* | 13745<br>*(61.14)* | 2.68<br>*(4.32)* | 2301 | 13.40 | 7th (3LH) Gear | | | air<br>cooled | 50<br>*(10.0)* | 55<br>*(13.3)* | 28.900<br>*(97.391)* |
| 98.55<br>*(73.47)* | 11965<br>*(53.31)* | 3.08<br>*(4.96)* | 2300 | 11.08 | 8th (1MH) Gear | | | air<br>cooled | 50<br>*(10.0)* | 62<br>*(16.7)* | 29.340<br>*(99.077)* |
| 98.91<br>*(73.76)* | 11867<br>*(52.79)* | 3.13<br>*(5.03)* | 2300 | 10.68 | 9th (4LL) Gear | | | air<br>cooled | 50<br>*(10.0)* | 62<br>*(16.7)* | 29.350<br>*(99.111)* |
| 101.68<br>*(75.83)* | 10441<br>*(46.44)* | 3.65<br>*(5.88)* | 2301 | 8.49 | 10th (2ML) Gear | | | air<br>cooled | 50<br>*(10.0)* | 63<br>*(17.2)* | 29.360<br>*(99.144)* |
| 101.42<br>*(75.63)* | 9466<br>*(42.11)* | 4.02<br>*(6.47)* | 2302 | 7.35 | 11th (4LH) Gear | | | air<br>cooled | 49<br>*(9.4)* | 61<br>*(16.1)* | 29.370<br>*(99.178)* |
| 103.35<br>*(77.07)* | 8365<br>*(37.21)* | 4.63<br>*(7.46)* | 2301 | 6.28 | 12th (2MH) Gear | | | air<br>cooled | 49<br>*(9.4)* | 61<br>*(16.1)* | 29.370<br>*(99.178)* |
| 105.63<br>*(78.77)* | 8330<br>*(37.05)* | 4.76<br>*(7.65)* | 2301 | 6.19 | 13th (3ML) Gear | | | air<br>cooled | 49<br>*(9.4)* | 60<br>*(15.6)* | 29.380<br>*(99.212)* |
| 104.22<br>*(77.72)* | 7005<br>*(31.16)* | 5.58<br>*(8.98)* | 2301 | 5.14 | 14th (1HL) Gear | | | air<br>cooled | 49<br>*(9.4)* | 60<br>*(15.6)* | 29.380<br>*(99.212)* |
| 105.57<br>*(78.72)* | 6642<br>*(29.55)* | 5.96<br>*(9.59)* | 2300 | 4.99 | 15th (3MH) Gear | | | air<br>cooled | 50<br>*(10.0)* | 64<br>*(17.8)* | 29.330<br>*(99.041)* |
| 103.77<br>*(77.38)* | 5712<br>*(25.41)* | 6.81<br>*(10.96)* | 2302 | 4.07 | 16th (4ML) Gear | | | air<br>cooled | 49<br>*(9.4)* | 62<br>*(16.7)* | 29.370<br>*(99.178)* |
| 103.04<br>*(76.84)* | 5534<br>*(24.62)* | 6.98<br>*(11.24)* | 2300 | 3.92 | 17th (1HH) Gear | | | air<br>cooled | 50<br>*(10.0)* | 62<br>*(16.7)* | 29.370<br>*(99.178)* |
| 103.31<br>*(77.04)* | 4791<br>*(21.31)* | 8.09<br>*(13.01)* | 2299 | 3.30 | 18th (2HL) Gear | | | air<br>cooled | 50<br>*(10.0)* | 62<br>*(16.7)* | 29.360<br>*(99.144)* |

**Department of Agricultural Engineering**

**Dates of Test:** September 14-22, 1981

**Manufacturer:** KLOCKNER-HUMBOLDT-DEUTZ, AG 5000 Cologne 80, West Germany

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 4.910 gal *(18.588 l)* **Drained from motor** 3.504 gal *(13.263 l)* **Transmission lubricant** SAE 20W20 **Total time engine was operated** 37.0 hours

**ENGINE: Make** Deutz Diesel **Type** 6 cylinder vertical with turbocharger **Serial No.** 6339251 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 4.02" × 4.92" *(102 mm × 125 mm)* **Compression ratio** 15.5 to 1 **Displacement** 374 cu in *(6128 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one paper cartridge **Oil cooler** radiator for crankcase oil, radiator for hydraulic oil, radiator for transmission oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** thermo-hydraulic fan.

**CHASSIS: Type** standard with duals **Serial No.** 76320092 **Tread width** 63.0" *(1600 mm)* to 126" *(3200 mm)* front 63.0"*(1600 mm)* to 86.6" *(2200 mm)* **Wheel base** 105.8" *(2688 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 35.4" *(900 mm)* Vertical distance above roadway 40.2" *(1020 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.4 *(2.2)* second 1.7 *(2.8)* third 2.0 *(3.2)* fourth 2.4 *(3.9)* fifth 2.5 *(4.0)* sixth 2.8 *(4.5)* seventh 3.1 *(5.0)* eighth 3.5 *(5.7)* ninth 3.5 *(5.7)* tenth 4.0 *(6.4)* eleventh 4.4 *(7.0)* twelfth 4.9 *(8.0)* thirteenth 5.1 *(8.3)* fourteenth 5.9 *(9.5)* fifteenth 6.3 *(10.2)* sixteenth 7.2 *(11.5)* seventeenth 7.3 *(11.8)* eighteenth 8.4 *(13.5)* nineteenth 8.8 *(14.2)* twentieth 10.4 *(16.8)* twenty-first 10.7 *(17.3)* twenty-second 13.2 *(21.3)* twenty-third 14.9 *(24.0)* twenty-fourth 17.9 *(28.8)* reverse 3.5 *(5.6)*, 4.3 *(6.9)*, 4.9 *(8.0)*, 6.1 *(9.8)*, 6.3 *(10.1)*, 7.8 *(12.5)*, 8.8 *(14.1)*, 10.9 *(17.5)* **Clutch** dry disc hydraulically operated by foot pedal **Brakes** caliper disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 161.4" *(4.1 m)* left 157.5" *(4.0 m)* (on concrete surface without brake) right 181.1" *(4.6 m)* left 189.0" *(4.8 m)* **Turning space diameter** (on concrete surface with brake applied) right 328.7" *(8.35 m)* left 324.8" *(8.25 m)* (on concrete surface without brake) right 378.0" *(9.60 m)* left 393.7" *(10.00 m)* **Power take-off** 1000 rpm at 2071 engine rpm and 540 rpm at 2071 engine rpm.

## LUGGING ABILITY IN 15th (3MH) GEAR

| Crankshaft Speed rpm | 2300 | 2071 | 1836 | 1607 | 1384 | 1141 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 6642<br>*(29.55)* | 7172<br>*(31.90)* | 7583<br>*(33.73)* | 8052<br>*(35.82)* | 8213<br>*(36.53)* | 7691<br>*(34.21)* |
| Increase in Pull % | 0 | 8 | 14 | 21 | 24 | 16 |
| Power—Hp<br>*(kW)* | 105.57<br>*(78.72)* | 102.33<br>*(76.31)* | 95.56<br>*(71.26)* | 88.49<br>*(65.99)* | 77.56<br>*(57.83)* | 60.17<br>*(44.87)* |
| Speed—Mph<br>*(km/h)* | 5.96<br>*(9.59)* | 5.35<br>*(8.61)* | 4.73<br>*(7.61)* | 4.12<br>*(6.63)* | 3.54<br>*(5.70)* | 2.93<br>*(4.72)* |
| Slip % | 4.99 | 5.29 | 5.59 | 5.89 | 6.19 | 5.74 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 82.5 |
| 75% of Pull at Maximum Power—Ten Hours | 82.0 |
| 50% of Pull at Maximum Power—Two Hours | 82.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 80.0 |
| Bystander in 24th (4HH) gear | 83.5 |

| **TIRES, BALLAST AND WEIGHT** | | **With Ballast** | **Without Ballast** |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Four 18.4-38; 8; 14 *(95)* | Four 18.4-38; 8; 14 *(95)* |
| **Ballast** | —Liquid (each inner) | 842 lb *(383 kg)* | None |
| | —Cast Iron (each inner) | 770 lb *(349 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 11.00-16; 8; 40 *(275)* | Two 11.00-16; 8; 40 *(275)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Cast Iron (each) | 232 lb *(105 kg)* | None |
| **Height of Drawbar** | | 25.5 in *(645 mm)* | 25.5 in *(645 mm)* |
| **Static Weight with Operator** | —Rear | 13225 lb *(5999 kg)* | 10000 lb *(4536 kg)* |
| | —Front | 4405 lb *(1998 kg)* | 3940 lb *(1787 kg)* |
| | —Total | 17630 lb *(7997 kg)* | 13940 lb *(6323 kg)* |

Deutz DX-130 Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 129°F *(53.9°C)*. Thirteen gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1404.

LOUIS I. LEVITICUS
Engineer-in Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Roy G. Arnold, Director**

# NEBRASKA TRACTOR TEST 1405—DEUTZ DX-120 DIESEL
## 15 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Cooling medium | Temperature °F (°C) Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1158 rpm)** | | | | | | | | |
| 111.29<br>(82.99) | 2400 | 6.901<br>(26.123) | 0.435<br>(0.264) | 16.13<br>(3.177) | air<br>cooled | 59<br>(15.0) | 75<br>(24.1) | 29.160<br>(98.469) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 101.90<br>(75.99) | 2072 | 6.214<br>(23.523) | 0.427<br>(0.260) | 16.40<br>(3.230) | air<br>cooled | 60<br>(15.4) | 76<br>(24.3) | 29.110<br>(98.300) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 97.10<br>(72.41) | 2463 | 5.946<br>(22.508) | 0.429<br>(0.261) | 16.33<br>(3.217) | air<br>cooled | 60<br>(15.6) | 76<br>(24.4) | ......<br>...... |
| 0.00<br>(0.00) | 2604 | 1.708<br>(6.465) | .....<br>...... | .....<br>..... | air<br>cooled | 60<br>(15.6) | 76<br>(24.4) | ......<br>...... |
| 49.85<br>(37.17) | 2538 | 3.741<br>(14.161) | 0.526<br>(0.320) | 13.33<br>(2.625) | air<br>cooled | 60<br>(15.6) | 76<br>(24.4) | ......<br>...... |
| 111.94<br>(83.47) | 2399 | 6.978<br>(26.415) | 0.437<br>(0.266) | 16.04<br>(3.160) | air<br>cooled | 60<br>(15.6) | 76<br>(24.4) | ......<br>...... |
| 25.45<br>(18.98) | 2576 | 2.727<br>(10.323) | 0.751<br>(0.457) | 9.33<br>(1.839) | air<br>cooled | 60<br>(15.3) | 75<br>(23.6) | ......<br>...... |
| 73.98<br>(55.17) | 2504 | 4.786<br>(18.117) | 0.455<br>(0.276) | 15.46<br>(3.045) | air<br>cooled | 59<br>(15.0) | 74<br>(23.3) | ......<br>...... |
| Av 59.72<br>Av (44.53) | 2514 | 4.314<br>(16.330) | 0.506<br>(0.308) | 13.84<br>(2.727) | air<br>cooled | 60<br>(15.4) | 75<br>(24.1) | 29.077<br>(98.188) |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 9th (1H) Gear** | | | | | | | | | | | |
| 92.86<br>(69.25) | 5787<br>(25.74) | 6.02<br>(9.68) | 2399 | 4.82 | 6.831<br>(25.860) | 0.516<br>(0.314) | 13.59<br>(2.678) | air<br>cooled | 62<br>(16.7) | 78<br>(25.5) | 28.820<br>(97.321) |
| **75% of Pull at Maximum Power—Ten Hours 9th (1H) Gear** | | | | | | | | | | | |
| 76.40<br>(56.97) | 4504<br>(20.03) | 6.36<br>(10.24) | 2507 | 3.70 | 5.669<br>(21.458) | 0.520<br>(0.316) | 13.48<br>(2.655) | air<br>cooled | 51<br>(10.5) | 62<br>(16.7) | 29.009<br>(97.959) |
| **50% of Pull at Maximum Power—Two Hours 9th (1H) Gear** | | | | | | | | | | | |
| 52.59<br>(39.21) | 3010<br>(13.39) | 6.55<br>(10.54) | 2548 | 2.49 | 4.370<br>(16.542) | 0.582<br>(0.354) | 12.03<br>(2.371) | air<br>cooled | 62<br>(16.7) | 79<br>(26.1) | 28.820<br>(97.321) |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (3H) Gear** | | | | | | | | | | | |
| 52.28<br>(38.98) | 2999<br>(13.34) | 6.54<br>(10.52) | 1459 | 2.69 | 3.478<br>(13.166) | 0.466<br>(0.284) | 15.03<br>(2.961) | air<br>cooled | 62<br>(16.4) | 67<br>(19.4) | 28.990<br>(97.895) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 87.95<br>(65.59) | 12615<br>(56.12) | 2.61<br>(4.21) | 2448 | 14.98 | 4th (1M) Gear | | | air<br>cooled | 55<br>(12.8) | 58<br>(14.4) | 28.970<br>(97.827) |
| 94.27<br>(70.30) | 10405<br>(46.28) | 3.40<br>(5.47) | 2400 | 9.78 | 5th (4L) Gear | | | air<br>cooled | 61<br>(16.1) | 71<br>(21.7) | 28.810<br>(97.287) |
| 94.94<br>(70.80) | 8985<br>(39.97) | 3.96<br>(6.38) | 2400 | 7.83 | 6th (2M) Gear | | | air<br>cooled | 60<br>(15.6) | 70<br>(21.1) | 28.810<br>(97.287) |
| 94.42<br>(70.41) | 8229<br>(36.60) | 4.30<br>(6.93) | 2399 | 6.97 | 7th (5L) Gear | | | air<br>cooled | 59<br>(15.0) | 69<br>(20.6) | 28.810<br>(97.287) |
| 95.93<br>(71.54) | 7260<br>(32.29) | 4.96<br>(7.97) | 2400 | 5.94 | 8th (3M) Gear | | | air<br>cooled | 58<br>(14.4) | 68<br>(20.0) | 28.800<br>(97.253) |
| 96.29<br>(71.80) | 6003<br>(26.70) | 6.01<br>(9.68) | 2399 | 4.89 | 9th (1H) Gear | | | air<br>cooled | 57<br>(13.9) | 66<br>(18.9) | 28.800<br>(97.253) |
| 97.41<br>(72.64) | 4990<br>(22.20) | 7.32<br>(11.78) | 2398 | 3.98 | 10th (4M) Gear | | | air<br>cooled | 62<br>(16.7) | 72<br>(22.2) | 28.820<br>(97.321) |
| 94.62<br>(70.56) | 4077<br>(18.14) | 8.70<br>(14.01) | 2399 | 3.36 | 11th (2H) Gear | | | air<br>cooled | 62<br>(16.7) | 73<br>(22.8) | 28.820<br>(97.321) |

**Department of Agricultural Engineering**

**Dates of Test:** September 17-24, 1981

**Manufacturer:** KLOCKNER-HUMBOLDT-DEUTZ AG, 5000 Cologne 80, West Germany

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 4.271 gal *(16.167 l)* **Drained from motor** 3.208 gal *(12.144 l)* **Transmission lubricant** SAE 20W20 **Total time engine was operated** 39.5 hours.

**ENGINE:** **Make** Deutz Diesel **Type** six cylinder vertical **Serial No.** 6472009 **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.02" × 4.92" *(102 mm × 125 mm)* **Compression ratio** 17 to 1 **Displacement** 374 cu in *(6128 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element, one felt element and centrifugal precleaner **Oil filter** one paper cartridge **Oil cooler** radiator for crankcase oil, radiator for hydraulic oil **Fuel filter** two paper cartridges **Muffler** vertical **Cooling medium temperature control** thermo hydraulic fan.

**CHASSIS:** **Type** standard with duals **Serial No.** 7626 0169 **Tread width** rear 63" *(1600 mm)* to 126" *(3200 mm)* front 63" *(1600 mm)* to 86.6" *(2200 mm)* **Wheel base** 105.8" *(2688 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 36.5" *(928 mm)* Vertical distance above roadway 39.3" *(997 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.4 *(2.2)* second 2.1 *(3.4)* third 2.6 *(4.2)* fourth 2.8 *(4.5)* fifth 3.8 *(6.1)* sixth 4.3 *(6.9)* seventh 4.6 *(7.4)* eighth 5.3 *(8.5)* ninth 5.9 *(9.5)* tenth 7.7 *(12.3)* eleventh 8.7 *(13.9)* twelfth 9.4 *(15.1)* thirteenth 11.1 *(17.8)* fourteenth 16.0 *(25.8)* fifteenth 19.7 *(31.7)* reverse 3.5 *(5.6)*, 5.3 *(8.5)*, 6.5 *(10.4)*, 9.4 *(15.1)*, 11.5 *(18.6)* **Clutch** dry disc operated by foot pedal **Brakes** caliper disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 161.4" *(4.1 m)* left 157.5" *(4.0 m)* (on concrete surface without brake) right 181.1" *(4.6 m)* left 189.0" *(4.8 m)* **Turning space diameter** (on concrete surface with brake applied) right 328.7" *(8.35 m)* left 324.8" *(8.25 m)* (on concrete surface without brake) right 378.0" *(9.60 m)* left 393.7" *(10.00 m)* **Power take-off** 1000 rpm at 2072 engine rpm and 540 rpm at 2071 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

### LUGGING ABILITY IN 9th (1H) GEAR

| Crankshaft Speed rpm | 2399 | 2158 | 1906 | 1680 | 1435 | 1194 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 6003<br>(26.70) | 6414<br>(28.53) | 6677<br>(29.70) | 6721<br>(29.90) | 6788<br>(30.20) | 6584<br>(29.29) |
| Increase in Pull % | 0 | 7 | 11 | 12 | 13 | 10 |
| Power—Hp<br>(kW) | 96.29<br>(71.80) | 92.21<br>(68.76) | 84.51<br>(63.02) | 74.97<br>(55.91) | 64.60<br>(48.17) | 52.24<br>(38.96) |
| Speed—Mph<br>(km/h) | 6.01<br>(9.68) | 5.39<br>(8.68) | 4.75<br>(7.64) | 4.18<br>(6.73) | 3.57<br>(5.74) | 2.98<br>(4.79) |
| Slip % | 4.89 | 5.20 | 5.50 | 5.50 | 5.50 | 5.50 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 85.0 |
| 75% of Pull at Maximum Power—Ten Hours | 84.5 |
| 50% of Pull at Maximum Power—Two Hours | 85.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 80.5 |
| Bystander in 15th (5H) gear | 88.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Four 18.4-38; 8; 12 *(85)* | Four 18.4-38; 8; 12 *(85)* |
| Ballast | —Liquid (each inner) | 910 lb *(413 kg)* | None |
| | —Cast Iron (each) | None | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 11.00-16; 6; 32 *(220)* | Two 11.00-16; 6; 32 *(220)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 80 lb *(36 kg)* | None |
| Height of Drawbar | | 24.5 in *(620 mm)* | 24.5 in *(620 mm)* |
| Static Weight with Operator—Rear | | 11240 lb *(5098 kg)* | 9420 lb *(4273 kg)* |
| —Front | | 3710 lb *(1683 kg)* | 3550 lb *(1610 kg)* |
| —Total | | 14950 lb *(6781 kg)* | 12970 lb *(5883 kg)* |

**Deutz DX-120 Diesel**

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 154°F *(67.8°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1405.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1406 — KUBOTA L235 4WD DIESEL
# ALSO KUBOTA L235 DIESEL
# 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—578 rpm)** | | | | | | | | |
| 19.59<br>*(14.61)* | 2600 | 1.382<br>*(5.231)* | 0.495<br>*(0.301)* | 14.17<br>*(2.793)* | 196<br>*(92.0)* | 62<br>*(16.7)* | 75<br>*(23.9)* | 29.020<br>*(97.996)* |
| **Standard Power take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 19.63<br>*(14.64)* | 2430 | 1.370<br>*(5.186)* | 0.489<br>*(0.298)* | 14.33<br>*(2.823)* | 197<br>*(91.7)* | 62<br>*(16.7)* | 75<br>*(23.8)* | 29.000<br>*(97.929)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 17.06<br>*(12.72)* | 2668 | 1.224<br>*(4.633)* | 0.505<br>*(0.306)* | 13.94<br>*(2.746)* | 188<br>*(86.4)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2867 | 0.467<br>*(1.768)* | .....<br>..... | .....<br>..... | 182<br>*(83.3)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ......<br>...... |
| 8.83<br>*(6.58)* | 2760 | 0.813<br>*(3.078)* | 0.646<br>*(0.393)* | 10.85<br>*(2.138)* | 185<br>*(84.7)* | 62<br>*(16.7)* | 75<br>*(23.6)* | ......<br>...... |
| 19.88<br>*(14.82)* | 2601 | 1.421<br>*(5.379)* | 0.501<br>*(0.305)* | 13.99<br>*(2.755)* | 194<br>*(90.3)* | 63<br>*(17.2)* | 75<br>*(23.6)* | ......<br>...... |
| 4.48<br>*(3.34)* | 2800 | 0.638<br>*(2.415)* | 0.997<br>*(0.607)* | 7.03<br>*(1.385)* | 183<br>*(83.9)* | 63<br>*(16.9)* | 75<br>*(23.6)* | ......<br>...... |
| 12.99<br>*(9.69)* | 2707 | 1.015<br>*(3.842)* | 0.547<br>*(0.333)* | 12.81<br>*(2.522)* | 188<br>*(86.4)* | 63<br>*(17.2)* | 75<br>*(23.9)* | ......<br>...... |
| **Av** 10.54<br>***Av*** *(7.86)* | 2734 | 0.930<br>*(3.520)* | 0.618<br>*(0.376)* | 11.34<br>*(2.233)* | 187<br>*(85.8)* | 62<br>*(16.9)* | 75<br>*(23.8)* | 28.900<br>*(97.591)* |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 15.36<br>*(11.45)* | 1230<br>*(5.47)* | 4.68<br>*(7.54)* | 2600 | 7.07 | 1.356<br>*(5.131)* | 0.618<br>*(0.376)* | 11.33<br>*(2.232)* | 184<br>*(84.4)* | 70<br>*(20.8)* | 76<br>*(24.4)* | 28.785<br>*(97.203)* |
| **75% of Pull at Maximum Power—Ten Hours 6th Gear** | | | | | | | | | | | |
| 12.74<br>*(9.50)* | 967<br>*(4.30)* | 4.94<br>*(7.95)* | 2697 | 5.50 | 1.174<br>*(4.443)* | 0.646<br>*(0.393)* | 10.85<br>*(2.138)* | 179<br>*(81.7)* | 57<br>*(14.0)* | 68<br>*(19.9)* | 28.843<br>*(97.398)* |
| **50% of Pull at Maximum Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 8.73<br>*(6.51)* | 641<br>*(2.85)* | 5.10<br>*(8.21)* | 2751 | 4.31 | 0.945<br>*(3.579)* | 0.759<br>*(0.462)* | 9.23<br>*(1.818)* | 176<br>*(80.0)* | 51<br>*(10.6)* | 61<br>*(16.1)* | 29.108<br>*(98.289)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th Gear** | | | | | | | | | | | |
| 8.74<br>*(6.52)* | 639<br>*(2.84)* | 5.13<br>*(8.26)* | 1624 | 3.99 | 0.767<br>*(2.903)* | 0.615<br>*(0.374)* | 11.40<br>*(2.245)* | 176<br>*(80.0)* | 57<br>*(13.9)* | 70<br>*(21.1)* | 29.035<br>*(98.047)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 15.41<br>*(11.49)* | 2440<br>*(10.85)* | 2.37<br>*(3.81)* | 2614 | 14.52 | 4th Gear | | | 185<br>*(85.6)* | 61<br>*(16.1)* | 75<br>*(23.9)* | 28.960<br>*(97.794)* |
| 15.48<br>*(11.54)* | 2004<br>*(8.91)* | 2.90<br>*(4.66)* | 2597 | 11.69 | 5th Gear | | | 182<br>*(83.3)* | 67<br>*(19.4)* | 71<br>*(21.7)* | 28.810<br>*(97.287)* |
| 16.05<br>*(11.97)* | 1285<br>*(5.72)* | 4.68<br>*(7.54)* | 2598 | 7.05 | 6th Gear | | | 181<br>*(82.8)* | 65<br>*(18.3)* | 66<br>*(18.9)* | 28.820<br>*(97.321)* |
| 14.88<br>*(11.10)* | 677<br>*(3.01)* | 8.24<br>*(13.27)* | 2599 | 3.69 | 7th Gear | | | 181<br>*(82.8)* | 65<br>*(18.3)* | 69<br>*(20.6)* | 28.820<br>*(97.321)* |

## LUGGING ABILITY IN 6th GEAR

| Crankshaft Speed rpm | 2598 | 2342 | 2067 | 1832 | 1555 | 1301 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 1285<br>*(5.72)* | 1424<br>*(6.33)* | 1543<br>*(6.86)* | 1600<br>*(7.12)* | 1608<br>*(7.15)* | 1591<br>*(7.08)* |
| Increase in Pull % | 0 | 11 | 20 | 25 | 25 | 24 |
| Power—Hp *(kW)* | 16.05<br>*(11.97)* | 15.90<br>*(11.86)* | 15.10<br>*(11.26)* | 13.81<br>*(10.30)* | 11.78<br>*(8.78)* | 9.76<br>*(7.28)* |
| Speed—Mph *(km/h)* | 4.68<br>*(7.54)* | 4.19<br>*(6.74)* | 3.67<br>*(5.91)* | 3.24<br>*(5.21)* | 2.75<br>*(4.42)* | 2.30<br>*(3.70)* |
| Slip % | 7.05 | 7.78 | 8.45 | 8.79 | 8.95 | 8.87 |

**Department of Agricultural Engineering**

**Dates of Test:** September 17-30, 1981

**Manufacturer:** KUBOTA LTD, 2-47 Shikitsu-higashi, 1-chome, Naniwa-ku, Osaka, Japan

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CD **To motor** 1.231 gal *(4.659 l)* **Drained from motor** 1.135 gal *(4.295 l)* **Transmission and hydraulic lubricant** SAE 20 hydraulic transmission fluid **Front axle lubricant** SAE 80 **Total time engine was operated** 42.5 hours.

**ENGINE:** **Make** Kubota Diesel **Type** three cylinder vertical **Serial No.** D1102-A-01439 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 3.0" × 3.23" *(76 mm × 82 mm)* **Compression ratio** 21 to 1 **Displacement** 68 cu in *(1115 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow paper cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** L235DT-10194 **Tread width** rear 40.0" *(1015 mm)* to 44.7" *(1135 mm)* front 39.4" *(1000 mm)* **Wheel base** 64.6" *(1640 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.1" *(790 mm)* Vertical distance above roadway 29.3" *(745 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 0.8 *(1.3)* second 1.3 *(2.1)* third 2.2 *(3.5)* fourth 2.9 *(4.7)* fifth 3.5 *(5.6)* sixth 5.3 *(8.5)* seventh 9.0 *(14.5)* eighth 12.1 *(19.4)* reverse 0.8 *(1.2)*, 1.2 *(1.8)*, 1.9 *(3.1)*, 2.6 *(4.2)*, 3.1 *(5.0)*, 4.8 *(7.7)*, 8.1 *(13.0)* **Clutch** single dry disc operated by foot pedal **Brakes** wet disc operated by two foot pedals which can be locked together **Steering** mechanical **Turning radius** (on concrete surface with brake applied) right 106" *(2.7 m)* left 106" *(2.7 m)* (on concrete surface without brake) right 122" *(3.1 m)* left 122" *(3.1 m)* **Turning space diameter** (on concrete surface with brake applied) right 217" *(5.5 m)* left 217" *(5.5 m)* (on concrete surface without brake) right 244" *(6.2 m)* left 244" *(6.2 m)* **Power take-off** 540 rpm at 2450 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

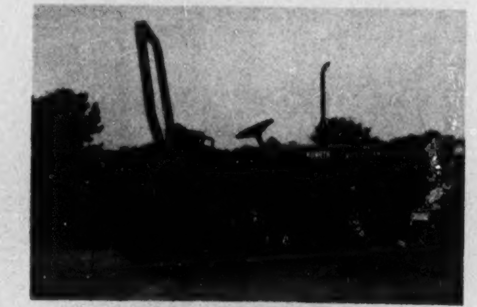
**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump inlet was maintained at 143°F *(61.4°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 91.0 | 90.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 90.5 |
| 50% of Pull at Maximum Power—Two Hours | | 89.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 84.0 |
| Bystander in 8th gear | | 77.0 |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 15.28<br>*(11.39)* | 1180<br>*(5.25)* | 4.85<br>*(7.81)* | 2598 | 5.19 | 1.391<br>*(5.267)* | 0.638<br>*(0.388)* | 10.98<br>*(2.163)* | 183<br>*(83.9)* | 70<br>*(21.1)* | 77<br>*(24.7)* | 28.750<br>*(97.084)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 14.92<br>*(11.13)* | 3065<br>*(13.63)* | 1.83<br>*(2.94)* | 2666 | 14.97 | 3rd Gear | | | 178<br>*(81.1)* | 45<br>*(7.2)* | 50<br>*(10.0)* | 29.120<br>*(98.334)* |
| 16.02<br>*(11.95)* | 1240<br>*(5.51)* | 4.85<br>*(7.80)* | 2597 | 5.26 | 6th Gear | | | 181<br>*(82.8)* | 65<br>*(18.3)* | 68<br>*(20.0)* | 28.820<br>*(97.321)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 9.5-24; 4; 14 *(95)* | Two 9.5-24; 4; 14 *(95)* |
| Ballast | —Liquid (each) | 180 lb *(82 kg)* | None |
| | —Cast Iron (each) | 338 lb *(153 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 6-14; 4; 28 *(195)* | Two 6-14; 4; 28 *(195)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 122 lb *(55 kg)* | None |
| Height of Drawbar | | 15 in *(380 mm)* | 15 in *(380 mm)* |
| Static Weight with Operator—Rear | | 2445 lb *(1109 kg)* | 1410 lb *(640 kg)* |
| Front | | 1270 lb *(576 kg)* | 1025 lb *(465 kg)* |
| Total | | 3715 lb *(1685 kg)* | 2435 lb *(1105 kg)* |



**Kubota L235 4WD Diesel**

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1406.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Roy G. Arnold, Director**

# NEBRASKA TRACTOR TEST 1407 — KUBOTA L275 4WD DIESEL
# ALSO KUBOTA L275 DIESEL
# 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—582 rpm)** | | | | | | | | |
| 23.42<br>(17.46) | 2600 | 1.649<br>(6.242) | 0.493<br>(0.300) | 14.21<br>(2.797) | 214<br>(101.2) | 68<br>(20.1) | 75<br>(23.8) | 28.977<br>(97.850) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 23.01<br>(17.16) | 2412 | 1.580<br>(5.981) | 0.481<br>(0.293) | 14.57<br>(2.869) | 214<br>(101.3) | 68<br>(20.0) | 75<br>(24.1) | 28.935<br>(97.709) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 20.50<br>(15.29) | 2676 | 1.468<br>(5.557) | 0.502<br>(0.305) | 13.96<br>(2.751) | 205<br>(96.1) | 68<br>(20.0) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2862 | 0.527<br>(1.995) | .....<br>..... | .....<br>..... | 183<br>(83.9) | 68<br>(20.0) | 75<br>(23.9) | ......<br>...... |
| 10.55<br>(7.87) | 2752 | 0.946<br>(3.581) | 0.628<br>(0.382) | 11.15<br>(2.196) | 187<br>(85.8) | 68<br>(19.7) | 75<br>(23.9) | ......<br>...... |
| 23.55<br>(17.55) | 2601 | 1.670<br>(6.322) | 0.497<br>(0.302) | 14.09<br>(2.776) | 212<br>(100.0) | 69<br>(20.6) | 75<br>(23.9) | ......<br>...... |
| 5.34<br>(3.98) | 2796 | 0.723<br>(2.737) | 0.949<br>(0.577) | 7.39<br>(1.456) | 185<br>(84.7) | 69<br>(20.3) | 75<br>(23.9) | ......<br>...... |
| 15.64<br>(11.66) | 2724 | 1.211<br>(4.584) | 0.543<br>(0.330) | 12.91<br>(2.544) | 189<br>(87.2) | 69<br>(20.6) | 75<br>(23.9) | ......<br>...... |
| Av 12.60<br>Av (9.39) | 2735 | 1.091<br>(4.130) | 0.607<br>(0.369) | 11.55<br>(2.274) | 193<br>(89.4) | 68<br>(20.2) | 75<br>(23.9) | 28.903<br>(97.603) |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 18.86<br>(14.07) | 1462<br>(6.50) | 4.84<br>(7.79) | 2591 | 7.48 | 1.623<br>(6.144) | 0.603<br>(0.367) | 11.62<br>(2.289) | 195<br>(90.6) | 54<br>(11.9) | 68<br>(19.7) | 29.070<br>(98.165) |
| **75% of Pull at Maximum Power—Ten Hours 6th Gear** | | | | | | | | | | | |
| 15.88<br>(11.85) | 1165<br>(5.18) | 5.13<br>(8.26) | 2610 | 5.40 | 1.416<br>(5.361) | 0.633<br>(0.385) | 11.07<br>(2.181) | 183<br>(83.9) | 62<br>(16.9) | 70<br>(21.2) | 28.756<br>(97.105) |
| **50% of Pull at Maximum Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 10.85<br>(8.09) | 768<br>(3.42) | 5.29<br>(8.51) | 2728 | 3.62 | 1.088<br>(4.119) | 0.704<br>(0.428) | 9.95<br>(1.960) | 180<br>(82.2) | 69<br>(20.6) | 85<br>(29.2) | 28.745<br>(97.068) |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th Gear** | | | | | | | | | | | |
| 10.82<br>(8.07) | 767<br>(3.41) | 5.29<br>(8.51) | 1602 | 3.33 | 0.856<br>(3.241) | 0.555<br>(0.337) | 12.65<br>(2.489) | 193<br>(89.2) | 71<br>(21.4) | 89<br>(31.8) | 28.720<br>(96.983) |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 18.09<br>(13.49) | 2717<br>(12.09) | 2.50<br>(4.02) | 2600 | 14.88 | 4th Gear | 180<br>(81.9) | 49<br>(9.4) | 56<br>(13.3) | 29.000<br>(98.131) |
| 18.99<br>(14.16) | 2395<br>(10.65) | 2.97<br>(4.78) | 2599 | 12.76 | 5th Gear | 190<br>(87.3) | 51<br>(10.6) | 62<br>(16.7) | 29.000<br>(98.199) |
| 19.70<br>(14.69) | 1526<br>(6.79) | 4.84<br>(7.79) | 2601 | 7.53 | 6th Gear | 187<br>(85.8) | 51<br>(10.6) | 58<br>(14.4) | 29.070<br>(98.165) |
| 18.78<br>(14.00) | 828<br>(3.68) | 8.50<br>(13.68) | 2599 | 4.22 | 7th Gear | 185<br>(85.0) | 52<br>(11.1) | 63<br>(17.2) | 29.090<br>(98.233) |

### LUGGING ABILITY IN 6th GEAR

| Crankshaft Speed rpm | 2601 | 2351 | 2080 | 1827 | 1550 | 1300 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 1526<br>(6.79) | 1682<br>(7.48) | 1790<br>(7.96) | 1877<br>(8.35) | 1905<br>(8.47) | 1870<br>(8.32) |
| Increase in Pull % | 0 | 10 | 17 | 23 | 25 | 23 |
| Power—Hp<br>(kW) | 19.70<br>(14.69) | 19.30<br>(14.39) | 18.15<br>(13.54) | 16.65<br>(12.41) | 14.31<br>(10.67) | 11.88<br>(8.86) |
| Speed—Mph<br>(km/h) | 4.84<br>(7.79) | 4.30<br>(6.92) | 3.80<br>(6.12) | 3.33<br>(5.35) | 2.82<br>(4.53) | 2.38<br>(3.83) |
| Slip % | 7.53 | 8.23 | 9.10 | 9.52 | 9.00 | 9.52 |

**Department of Agricultural Engineering**

**Dates of Test:** September 17 to October 2, 1981

**Manufacturer:** KUBOTA LTD, 2-47 Shikitsu higashi, 1-chome, Naniwa-ku, Osaka, Japan

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CD **To motor** 1.232 gal *(4.664 l)* **Drained from motor** 1.101 gal *(4.169 l)* **Transmission and hydraulic lubricant** SAE 20 hydraulic transmission oil **Front axle lubricant** SAE 80 **Total time engine was operated** 48.5 hours.

**ENGINE: Make** Kubota Diesel **Type** three cylinder vertical **Serial No.** D1302-A-01544 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 3.23" × 3.23" *(82 mm × 82 mm)* **Compression ratio** 21 to 1 **Displacement** 79.3 cu in *(1299 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** front wheel assist **Serial No.** L275DT-10209 **Tread width** rear 40.6" *(1030 mm)* to 55.1" *(1400 mm)* front 43.3" *(1100 mm)* **Wheel base** 64.6" *(1640 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 29.9" *(760 mm)* Vertical distance above roadway 29.1" *(740 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 0.9 *(1.4)* second 1.3 *(2.1)* third 2.2 *(3.6)* fourth 3.0 *(4.8)* fifth 3.6 *(5.8)* sixth 5.5 *(8.8)* seventh 9.3 *(15.0)* eighth 12.4 *(20.0)* reverse 0.8 *(1.2)*, 1.2 *(1.9)*, 2.0 *(3.2)*, 2.7 *(4.3)*, 3.2 *(5.2)*, 4.9 *(7.9)*, 8.4 *(13.5)* **Clutch** dual plate dry disc operated by foot pedal **Brakes** wet disc operated by two foot pedals which can be locked together **Steering** mechanical **Turning radius** (on concrete surface with brake applied) right 106" *(2.7 m)* left 106" *(2.7 m)* (on concrete surface without brake) right 122" *(3.1 m)* left 122" *(3.1 m)* **Turning space diameter** (on concrete surface with brake applied) right 217" *(5.5 m)* left 217" *(5.5 m)* (on concrete surface without brake) right 256" *(6.5 m)* left 256" *(6.5 m)* **Power take-off** 540 rpm at 2412 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump inlet was maintained at 149°F *(64.8°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 91.5 | 90.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 89.0 |
| 50% of Pull at Maximum Power—Two Hours | | 88.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 85.0 |
| Bystander in 8th gear | | 77.0 |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th Gear** | | | | | | | | | | | |
| 18.57<br>(13.85) | 1382<br>(6.15) | 5.04<br>(8.11) | 2596 | 5.48 | 1.623<br>(6.144) | 0.613<br>(0.373) | 11.44<br>(2.253) | 197<br>(91.7) | 54<br>(12.2) | 70<br>(20.8) | 29.045<br>(98.081) |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 16.86<br>(12.57) | 3302<br>(14.69) | 1.91<br>(3.08) | 2603 | 14.91 | 3rd Gear | 179<br>(81.4) | 46<br>(7.8) | 50<br>(10.0) | 29.040<br>(98.064) |
| 19.34<br>(14.42) | 1440<br>(6.41) | 5.04<br>(8.10) | 2597 | 5.56 | 6th Gear | 184<br>(84.2) | 51<br>(10.6) | 61<br>(16.1) | 29.080<br>(98.199) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 11.2-24; 4; 14 (97) | Two 11.2-24; 4; 14 (97) |
| Ballast | —Liquid (each) | 200 lb (91 kg) | None |
| | —Cast Iron (each) | 330 lb (149 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 7-16; 4; 26 (180) | Two 7-16; 4; 26 (180) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 185 lb (84 kg) | None |
| Height of Drawbar | | 15 in (380 mm) | 15 in (380 mm) |
| Static Weight with Operator—Rear | | 2615 lb (1186 kg) | 1555 lb (705 kg) |
| Front | | 1440 lb (653 kg) | 1070 lb (485 kg) |
| Total | | 4055 lb (1839 kg) | 2625 lb (1190 kg) |

**Kubota L275 4WD Diesel**

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1407.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1409 — HESSTON 1380 DT FIAT DIESEL
# ALSO HESSTON 1380 FIAT DIESEL
# ALSO HESSTON 1380 DT TURBO FIAT DIESEL
# AND HESSTON 1380 TURBO FIAT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1034 rpm)** | | | | | | | | |
| 123.16<br>*(91.84)* | 2400 | 7.621<br>*(28.849)* | 0.427<br>*(0.260)* | 16.16<br>*(3.183)* | 193<br>*(89.4)* | 55<br>*(12.7)* | 75<br>*(23.9)* | 29.087<br>*(98.221)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 123.54<br>*(92.12)* | 2320 | 7.493<br>*(28.364)* | 0.418<br>*(0.254)* | 16.49<br>*(3.248)* | 193<br>*(89.5)* | 55<br>*(12.8)* | 75<br>*(23.9)* | 29.060<br>*(98.131)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 106.91<br>*(79.72)* | 2451 | 6.812<br>*(25.786)* | 0.439<br>*(0.267)* | 15.70<br>*(3.092)* | 191<br>*(88.3)* | 56<br>*(13.1)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2594 | 2.162<br>*(8.184)* | ......<br>...... | ......<br>...... | 183<br>*(83.9)* | 55<br>*(12.8)* | 74<br>*(23.3)* | ......<br>...... |
| 55.20<br>*(41.16)* | 2536 | 4.385<br>*(16.599)* | 0.548<br>*(0.333)* | 12.59<br>*(2.480)* | 185<br>*(85.0)* | 55<br>*(12.8)* | 74<br>*(23.3)* | ......<br>...... |
| 123.77<br>*(92.30)* | 2400 | 7.621<br>*(28.849)* | 0.425<br>*(0.258)* | 16.24<br>*(3.199)* | 193<br>*(89.2)* | 55<br>*(12.8)* | 74<br>*(23.3)* | ......<br>...... |
| 27.76<br>*(20.70)* | 2552 | 3.193<br>*(12.087)* | 0.793<br>*(0.483)* | 8.70<br>*(1.713)* | 183<br>*(83.9)* | 55<br>*(12.8)* | 74<br>*(23.3)* | ......<br>...... |
| 81.50<br>*(60.77)* | 2488 | 5.529<br>*(20.926)* | 0.468<br>*(0.285)* | 14.74<br>*(2.904)* | 190<br>*(87.6)* | 55<br>*(12.8)* | 75<br>*(23.6)* | ......<br>...... |
| Av 65.86<br>Av *(49.11)* | 2562 | 4.956<br>*(18.758)* | 0.518<br>*(0.315)* | 13.30<br>*(2.621)* | 187<br>*(86.3)* | 55<br>*(12.8)* | 74<br>*(23.5)* | 29.003<br>*(97.940)* |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 101.54<br>*(75.72)* | 7666<br>*(34.10)* | 4.97<br>*(7.99)* | 2400 | 6.53 | 7.467<br>*(28.266)* | 0.507<br>*(0.309)* | 13.60<br>*(2.679)* | 187<br>*(86.1)* | 51<br>*(10.6)* | 63<br>*(17.2)* | 29.200<br>*(98.604)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (M3) Gear** | | | | | | | | | | | |
| 82.20<br>*(61.30)* | 5886<br>*(26.18)* | 5.24<br>*(8.43)* | 2480 | 4.50 | 6.318<br>*(23.916)* | 0.530<br>*(0.322)* | 13.01<br>*(2.563)* | 183<br>*(83.9)* | 47<br>*(8.3)* | 57<br>*(13.7)* | 29.078<br>*(98.192)* |
| **50% of Pull at Maximum Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 56.45<br>*(42.10)* | 3929<br>*(17.48)* | 5.39<br>*(8.67)* | 2515 | 3.21 | 4.857<br>*(18.386)* | 0.593<br>*(0.361)* | 11.62<br>*(2.290)* | 179<br>*(81.7)* | 48<br>*(8.6)* | 57<br>*(13.9)* | 28.870<br>*(97.490)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (H1) Gear** | | | | | | | | | | | |
| 56.51<br>*(42.14)* | 3929<br>*(17.48)* | 5.39<br>*(8.68)* | 1594 | 3.13 | 3.734<br>*(14.133)* | 0.456<br>*(0.277)* | 15.14<br>*(2.982)* | 181<br>*(82.5)* | 50<br>*(10.0)* | 62<br>*(16.7)* | 28.815<br>*(97.304)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 85.48<br>*(63.74)* | 13106<br>*(58.29)* | 2.45<br>*(3.94)* | 2450 | 14.86 | 4th (L4) Gear | 179<br>*(81.4)* | 41<br>*(5.0)* | 44<br>*(6.7)* | 28.880<br>*(97.523)* |
| 98.96<br>*(73.80)* | 12100<br>*(53.82)* | 3.07<br>*(4.94)* | 2398 | 12.02 | 5th (M1) Gear | 185<br>*(84.7)* | 44<br>*(6.7)* | 50<br>*(10.0)* | 28.900<br>*(97.591)* |
| 103.62<br>*(77.27)* | 9634<br>*(42.85)* | 4.03<br>*(6.49)* | 2400 | 8.12 | 6th (M2) Gear | 187<br>*(86.1)* | 50<br>*(10.0)* | 58<br>*(14.4)* | 29.260<br>*(98.807)* |
| 104.14<br>*(77.66)* | 7843<br>*(34.89)* | 4.98<br>*(8.01)* | 2399 | 6.18 | 7th (M3) Gear | 186<br>*(85.6)* | 47<br>*(8.3)* | 53<br>*(11.7)* | 29.240<br>*(98.739)* |
| 104.44<br>*(77.88)* | 6433<br>*(28.61)* | 6.09<br>*(9.80)* | 2400 | 4.95 | 8th (M4) Gear | 187<br>*(86.1)* | 50<br>*(10.0)* | 59<br>*(15.0)* | 29.250<br>*(98.773)* |
| 104.97<br>*(78.27)* | 4873<br>*(21.68)* | 8.08<br>*(13.00)* | 2400 | 3.60 | 9th (H1) Gear | 187<br>*(85.8)* | 51<br>*(10.6)* | 61<br>*(16.1)* | 29.230<br>*(98.705)* |

**Department of Agricultural Engineering**

**Dates of Test:** September 30 to October 9, 1981

**Manufacturer:** FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100, Modena, Italy

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 45.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 3.431 gal *(12.986 l)* **Drained from motor** 3.158 gal *(11.954 l)* **Transmission lubricant** SAE 20W-40 **Final drive lubricant** API 303 **Total time engine was operated** 41.5 hours.

**ENGINE:** **Make** Fiat Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 8065.24*000-206434* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.055" × 4.33" *(103 mm × 110 mm)* **Compression ratio** 16.5 to 1 **Displacement** 335 cu in *(5499 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** two paper cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** two paper cartridges with sediment bowl **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist with duals **Serial No.** 1380 DT/12*755900* **Tread width** rear 64.6" *(1640 mm)* to 118.5" *(3010 mm)* front 70.9" *(1800 mm)* to 88.0" *(2235 mm)* **Wheel base** 105.2" *(2672 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 34.6" *(880 mm)* Vertical distance above roadway 42.5" *(1080 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 1.5 *(2.4)* second 1.9 *(3.1)* third 2.3 *(3.7)* fourth 2.8 *(4.5)* fifth 3.4 *(5.6)* sixth 4.4 *(7.0)* seventh 5.3 *(8.5)* eighth 6.3 *(10.2)* ninth 8.3 *(13.4)* tenth 10.5 *(16.8)* eleventh 12.6 *(20.4)* twelfth 15.3 *(24.6)* reverse 3.5 *(5.7)*, 4.4 *(7.1)*, 5.4 *(8.6)*, 6.5 *(10.4)* **Clutch** single dry disc operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 202" *(5.14 m)* left 204" *(5.18 m)* (on concrete surface without brake) right 241" *(6.13 m)* left 241" *(6.13 m)* **Turning space diameter** (on concrete surface with brake applied) right 419" *(10.66 m)* left 423" *(10.74 m)* (on concrete surface without brake) right 497" *(12.62 m)* left 497" *(12.62 m)* **Power take-off** 1000 rpm at 2320 engine rpm and 540 rpm at 2095 engine rpm.

## LUGGING ABILITY IN 7th (M3) GEAR

| Crankshaft Speed rpm | 2399 | 2162 | 1917 | 1686 | 1441 | 1195 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 7843<br>*(34.89)* | 8631<br>*(38.39)* | 9099<br>*(40.47)* | 9405<br>*(41.84)* | 9387<br>*(41.76)* | 8821<br>*(39.24)* |
| Increase in Pull % | 0 | 10 | 16 | 20 | [illegible] | 12 |
| Power—Hp<br>*(kW)* | 104.14<br>*(77.66)* | 102.40<br>*(76.36)* | 95.19<br>*(70.98)* | 86.17<br>*(64.26)* | 73.50<br>*(54.81)* | 57.64<br>*(42.98)* |
| Speed—Mph<br>*(km/h)* | 4.98<br>*(8.01)* | 4.45<br>*(7.16)* | 3.92<br>*(6.31)* | 3.44<br>*(5.53)* | 2.94<br>*(4.73)* | 2.45<br>*(3.94)* |
| Slip % | 6.18 | 6.94 | 7.38 | 7.97 | 7.97 | 7.38 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 78.0 | 78.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 79.0 |
| 50% of Pull at Maximum Power—Two Hours | | 78.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 73.5 |
| Bystander in 12th (H4) gear | | 89.5 |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 102.45<br>*(76.40)* | 7575<br>*(33.69)* | 5.07<br>*(8.16)* | 2400 | 4.64 | 7.503<br>*(28.403)* | 0.505<br>*(0.307)* | 13.65<br>*(2.690)* | 187<br>*(85.8)* | 52<br>*(11.1)* | 65<br>*(18.3)* | 29.155<br>*(98.452)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 84.81<br>*(63.24)* | 15641<br>*(69.58)* | 2.05<br>*(3.27)* | 2461 | 14.85 | 3rd (L3) Gear | | | 179<br>*(81.7)* | 43<br>*(6.1)* | 48<br>*(8.9)* | 28.890<br>*(97.557)* |
| 105.47<br>*(78.65)* | 7791<br>*(34.66)* | 5.08<br>*(8.17)* | 2399 | 4.53 | 7th (M3) Gear | | | 187<br>*(86.1)* | 49<br>*(9.4)* | 56<br>*(13.3)* | 29.250<br>*(98.773)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 18.4-38; 8; 14 *(95)* | Four 18.4-38; 8; 14 *(95)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each inner) | 770 lb *(349 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 14.9-28; 6; 20 *(140)* | Two 14.9-28; 6; 20 *(140)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 128 lb *(58 kg)* | None |
| Height of Drawbar | | 20 in *(510 mm)* | 20 in *(510 mm)* |
| Static Weight with Operator | —Rear | 11740 lb *(5325 kg)* | 10200 lb *(4627 kg)* |
| | Front | 5255 lb *(2384 kg)* | 5000 lb *(2268 kg)* |
| | Total | 16995 lb *(7709 kg)* | 15200 lb *(6895 kg)* |

Hesston 1380 DT Fiat Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.4°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1409.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

# NEBRASKA TRACTOR TEST 1410 — HESSTON 1880 DT FIAT DIESEL
# ALSO HESSTON 1880 FIAT DIESEL
# ALSO HESSTON 1880 DT TURBO FIAT DIESEL
# AND HESSTON 1880 TURBO FIAT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1061 rpm)** | | | | | | | | |
| 162.48<br>*(121.16)* | 2200 | 9.626<br>*(36.438)* | 0.409<br>*(0.249)* | 16.88<br>*(3.325)* | 182<br>*(83.4)* | 63<br>*(17.2)* | 75<br>*(23.8)* | 28.917<br>*(97.647)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 159.83<br>*(119.19)* | 2074 | 9.213<br>*(34.875)* | 0.398<br>*(0.242)* | 17.35<br>*(3.418)* | 183<br>*(83.8)* | 62<br>*(16.7)* | 75<br>*(23.9)* | 28.960<br>*(97.794)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 141.18<br>*(105.28)* | 2248 | 8.625<br>*(32.649)* | 0.421<br>*(0.256)* | 16.37<br>*(3.225)* | 182<br>*(83.3)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ...... |
| 0.00<br>*(0.00)* | 2418 | 2.732<br>*(10.342)* | ..... | ..... | 180<br>*(82.2)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ...... |
| 73.55<br>*(54.85)* | 2346 | 5.585<br>*(21.142)* | 0.524<br>*(0.319)* | 13.17<br>*(2.594)* | 181<br>*(82.8)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ...... |
| 163.75<br>*(122.11)* | 2200 | 9.636<br>*(36.472)* | 0.406<br>*(0.247)* | 17.00<br>*(3.348)* | 183<br>*(83.6)* | 63<br>*(16.9)* | 76<br>*(24.2)* | ...... |
| 37.45<br>*(27.93)* | 2382 | 4.158<br>*(15.740)* | 0.766<br>*(0.466)* | 9.01<br>*(1.774)* | 180<br>*(82.2)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ...... |
| 108.35<br>*(80.80)* | 2300 | 7.068<br>*(26.755)* | 0.450<br>*(0.274)* | 15.33<br>*(3.021)* | 182<br>*(83.1)* | 62<br>*(16.7)* | 75<br>*(23.9)* | ...... |
| Av 87.39<br>Av *(65.17)* | 2315 | 6.301<br>*(23.852)* | 0.497<br>*(0.303)* | 13.87<br>*(2.732)* | 181<br>*(82.9)* | 62<br>*(16.7)* | 75<br>*(23.9)* | 28.960<br>*(97.861)* |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Disengaged)

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 135.64<br>*(101.14)* | 9360<br>*(41.63)* | 5.43<br>*(8.75)* | 2201 | 5.92 | 9.334<br>*(35.332)* | 0.475<br>*(0.289)* | 14.53<br>*(2.863)* | 173<br>*(78.3)* | 59<br>*(14.7)* | 59<br>*(14.7)* | 28.730<br>*(97.017)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (M3) Gear** | | | | | | | | | | | |
| 109.88<br>*(81.94)* | 7181<br>*(31.94)* | 5.74<br>*(9.23)* | 2289 | 4.49 | 8.090<br>*(30.626)* | 0.508<br>*(0.309)* | 13.58<br>*(2.676)* | 178<br>*(81.1)* | 52<br>*(11.1)* | 55<br>*(12.8)* | 28.659<br>*(96.777)* |
| **50% of Pull at Maximum Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 76.60<br>*(57.12)* | 4818<br>*(21.43)* | 5.96<br>*(9.60)* | 2335 | 2.53 | 6.343<br>*(24.012)* | 0.571<br>*(0.347)* | 12.07<br>*(2.379)* | 175<br>*(79.2)* | 52<br>*(11.1)* | 66<br>*(18.9)* | 28.945<br>*(97.743)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (H1) Gear** | | | | | | | | | | | |
| 76.23<br>*(56.84)* | 4797<br>*(21.34)* | 5.96<br>*(9.59)* | 1481 | 2.78 | 5.020<br>*(19.004)* | 0.454<br>*(0.276)* | 15.18<br>*(2.991)* | 171<br>*(77.2)* | 58<br>*(14.4)* | 61<br>*(16.1)* | 28.810<br>*(97.287)* |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 111.16<br>*(82.89)* | 15056<br>*(66.97)* | 2.66<br>*(4.28)* | 2233 | 14.88 | 4th (L4) Gear | 172<br>*(77.8)* | 57<br>*(13.9)* | 58<br>*(14.4)* | 28.700<br>*(96.916)* |
| 129.73<br>*(96.74)* | 14702<br>*(65.40)* | 3.31<br>*(5.33)* | 2199 | 12.65 | 5th (M1) Gear | 176<br>*(80.0)* | 49<br>*(9.4)* | 62<br>*(16.7)* | 29.010<br>*(97.962)* |
| 137.74<br>*(102.71)* | 11697<br>*(52.03)* | 4.42<br>*(7.11)* | 2201 | 7.51 | 6th (M2) Gear | 176<br>*(80.0)* | 49<br>*(9.4)* | 61<br>*(16.1)* | 29.030<br>*(98.030)* |
| 138.81<br>*(103.51)* | 9565<br>*(42.55)* | 5.44<br>*(8.76)* | 2200 | 5.72 | 7th (M3) Gear | 176<br>*(79.7)* | 48<br>*(8.9)* | 57<br>*(13.9)* | 29.080<br>*(98.199)* |
| 138.77<br>*(103.48)* | 7824<br>*(34.80)* | 6.65<br>*(10.70)* | 2200 | 4.52 | 8th (M4) Gear | 176<br>*(80.0)* | 50<br>*(10.0)* | 63<br>*(17.2)* | 29.000<br>*(97.929)* |
| 138.09<br>*(102.97)* | 5876<br>*(26.14)* | 8.81<br>*(14.18)* | 2200 | 3.28 | 9th (H1) Gear | 176<br>*(80.0)* | 51<br>*(10.6)* | 64<br>*(17.8)* | 28.990<br>*(97.895)* |

**Department of Agricultural Engineering**

**Dates of Test:** September 29 to October 6, 1981

**Manufacturer:** FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100, Modena, Italy

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 4.028 gal *(15.248 l)* **Drained from motor** 3.294 gal *(12.468 l)* **Transmission lubricant** SAE 20W-40 **Final drive lubricant** API 303 **Total time engine was operated** 38.0 hours.

**ENGINE:** **Make** Fiat Diesel **Type** six cylinder vertical with turbocharger **Serial No.** CM8365.25*500*161174* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.528" × 5.118" *(115 mm × 130 mm)* **Compression ratio** 15.5 to 1 **Displacement** 494 cu in *(8102 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** one paper cartridge, one paper element and sediment bowl **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist with duals **Serial No.** 1880 DT/12* 745695* **Tread width** rear 64.6" *(1640 mm)* to 121" *(3075 mm)* front 74.8" *(1900 mm)* to 86.6" *(2200 mm)* **Wheel base** 113.6" *(2885 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 37.2" *(945 mm)* Vertical distance above roadway 42.5" *(1080 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 1.7 *(2.7)* second 2.1 *(3.4)* third 2.5 *(4.1)* fourth 3.1 *(4.9)* fifth 3.8 *(6.1)* sixth 4.8 *(7.7)* seventh 5.8 *(9.3)* eighth 7.0 *(11.3)* ninth 9.2 *(14.7)* tenth 11.6 *(18.6)* eleventh 14.0 *(22.5)* twelfth 16.9 *(27.1)* reverse 3.9 *(6.2)*, 4.9 *(7.9)*, 5.9 *(9.5)*, 7.2 *(11.5)* **Clutch** single dry disc operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 225" *(5.72 m)* left 233" *(5.91 m)* (on concrete surface without brake) right 265" *(6.72 m)* left 267" *(6.77 m)* **Turning space diameter** (on concrete surface with brake applied) right 467" *(11.87 m)* left 482" *(12.25 m)* (on concrete surface without brake) right 546" *(13.87 m)* left 550" *(13.97 m)* **Power take-off** 1000 rpm at 2074 engine rpm.

### LUGGING ABILITY IN 7th (M3) GEAR

| Crankshaft Speed rpm | 2200 | 1984 | 1757 | 1546 | 1319 | 1093 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 9565<br>*(42.55)* | 10377<br>*(46.16)* | 10969<br>*(48.79)* | 11688<br>*(51.99)* | 12074<br>*(53.71)* | 11179<br>*(49.72)* |
| Increase in Pull % | 0 | 8 | 15 | 22 | 26 | 17 |
| Power—Hp *(kW)* | 138.81<br>*(103.51)* | 134.86<br>*(100.56)* | 125.61<br>*(93.67)* | 116.51<br>*(86.88)* | 102.56<br>*(76.48)* | 79.36<br>*(59.18)* |
| Speed—Mph *(km/h)* | 5.44<br>*(8.76)* | 4.87<br>*(7.84)* | 4.29<br>*(6.91)* | 3.74<br>*(6.02)* | 3.19<br>*(5.13)* | 2.66<br>*(4.28)* |
| Slip % | 5.72 | 6.28 | 6.74 | 7.36 | 7.97 | 7.21 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 81.0 | 81.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 80.5 |
| 50% of Pull at Maximum Power—Two Hours | | 79.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 75.5 |
| Bystander in 12th (H4) gear | | 88.0 |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 136.47<br>*(101.76)* | 9220<br>*(41.01)* | 5.55<br>*(8.93)* | 2199 | 4.40 | 9.370<br>*(35.469)* | 0.474<br>*(0.288)* | 14.56<br>*(2.869)* | 174<br>*(78.6)* | 60<br>*(15.6)* | 61<br>*(16.1)* | 28.760<br>*(97.118)* |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 127.10<br>*(94.78)* | 18223<br>*(81.06)* | 2.62<br>*(4.21)* | 2208 | 14.87 | 4th (L4) Gear | 173<br>*(78.3)* | 58<br>*(14.4)* | 59<br>*(15.0)* | 28.720<br>*(96.983)* |
| 139.96<br>*(104.37)* | 11576<br>*(51.49)* | 4.53<br>*(7.30)* | 2200 | 5.57 | 6th (M2) Gear | 176<br>*(80.0)* | 48<br>*(8.9)* | 60<br>*(15.6)* | 29.050<br>*(98.097)* |
| 140.40<br>*(104.69)* | 9473<br>*(42.14)* | 5.56<br>*(8.94)* | 2199 | 4.11 | 7th (M3) Gear | 176<br>*(80.0)* | 48<br>*(8.9)* | 59<br>*(15.0)* | 29.070<br>*(98.165)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 20.8-38; 8; 14 *(95)* | Four 20.8-38; 8; 14 *(95)* |
| Ballast | —Liquid (each inner) | 1165 lb *(528 kg)* | None |
| | —Cast Iron (each inner) | 300 lb *(136 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 16.9-28; 6; 16 *(110)* | Two 16.9-28; 6; 16 *(110)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 45 lb *(20 kg)* | None |
| Height of Drawbar | | 20 in *(510 mm)* | 20 in *(510 mm)* |
| Static Weight with Operator | —Rear | 14160 lb *(6423 kg)* | 11230 lb *(5094 kg)* |
| | Front | 5550 lb *(2517 kg)* | 5460 lb *(2477 kg)* |
| | Total | 19710 lb *(8940 kg)* | 16690 lb *(7571 kg)* |

**Hesston 1880 DT Fiat Diesel**

**REPAIRS and ADJUSTMENTS:** During preliminary PTO testing, the fuel sediment bowl cracked. The bowl and gasket were replaced and test continued. During the maximum available power drawbar test the rear support strap of the lower fuel tank fell off. This was replaced at the end of this test.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 133°F *(56.0°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1410.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1411 — MASSEY-FERGUSON MF 154-4 DIESEL 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—625 rpm)** | | | | | | | | |
| 42.52<br>*(31.71)* | 2250 | 2.599<br>*(9.838)* | 0.421<br>*(0.256)* | 16.36<br>*(3.223)* | 190<br>*(87.7)* | 60<br>*(15.6)* | 75<br>*(23.8)* | 28.953<br>*(97.771)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 40.38<br>*(30.11)* | 1943 | 2.339<br>*(8.854)* | 0.399<br>*(0.243)* | 17.26<br>*(3.401)* | 190<br>*(87.8)* | 61<br>*(15.9)* | 75<br>*(23.9)* | 28.960<br>*(97.794)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 36.93<br>*(27.54)* | 2298 | 2.280<br>*(8.631)* | 0.426<br>*(0.259)* | 16.20<br>*(3.191)* | 187<br>*(86.1)* | 61<br>*(15.8)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2380 | 0.774<br>*(2.930)* | .....<br>..... | .....<br>..... | 183<br>*(83.6)* | 60<br>*(15.6)* | 75<br>*(23.6)* | ......<br>...... |
| 18.84<br>*(14.05)* | 2344 | 1.484<br>*(5.618)* | 0.543<br>*(0.330)* | 12.70<br>*(2.501)* | 184<br>*(84.4)* | 60<br>*(15.6)* | 74<br>*(23.3)* | ......<br>...... |
| 42.57<br>*(31.74)* | 2250 | 2.611<br>*(9.884)* | 0.423<br>*(0.257)* | 16.31<br>*(3.211)* | 190<br>*(87.8)* | 60<br>*(15.6)* | 75<br>*(23.9)* | ......<br>...... |
| 9.52<br>*(7.10)* | 2368 | 1.109<br>*(4.198)* | 0.804<br>*(0.489)* | 8.58<br>*(1.691)* | 183<br>*(83.6)* | 60<br>*(15.6)* | 74<br>*(23.3)* | ......<br>...... |
| 27.88<br>*(20.79)* | 2314 | 1.867<br>*(7.067)* | 0.462<br>*(0.281)* | 14.94<br>*(2.942)* | 185<br>*(85.0)* | 60<br>*(15.6)* | 75<br>*(23.9)* | ......<br>...... |
| Av 22.62<br>Av *(16.87)* | 2326 | 1.687<br>*(6.386)* | 0.514<br>*(0.313)* | 13.41<br>*(2.642)* | 185<br>*(85.1)* | 60<br>*(15.6)* | 75<br>*(23.7)* | 28.955<br>*(97.777)* |

## DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 8th Gear** | | | | | | | | | | | |
| 34.75<br>*(25.91)* | 2867<br>*(12.75)* | 4.54<br>*(7.31)* | 2250 | 9.11 | 2.520<br>*(9.539)* | 0.500<br>*(0.304)* | 13.79<br>*(2.716)* | 183<br>*(83.9)* | 53<br>*(11.7)* | 57<br>*(13.9)* | 28.660<br>*(96.781)* |
| **75% of Pull at Maximum Power—Ten Hours 8th Gear** | | | | | | | | | | | |
| 27.87<br>*(20.78)* | 2202<br>*(9.80)* | 4.75<br>*(7.64)* | 2294 | 6.91 | 2.143<br>*(8.112)* | 0.530<br>*(0.323)* | 13.00<br>*(2.562)* | 181<br>*(82.8)* | 51<br>*(10.4)* | 57<br>*(13.8)* | 29.013<br>*(97.973)* |
| **50% of Pull at Maximum Power—Two Hours 8th Gear** | | | | | | | | | | | |
| 19.47<br>*(14.52)* | 1479<br>*(6.58)* | 4.94<br>*(7.94)* | 2325 | 4.50 | 1.704<br>*(6.451)* | 0.604<br>*(0.367)* | 11.42<br>*(2.251)* | 181<br>*(82.8)* | 53<br>*(11.7)* | 65<br>*(18.3)* | 29.145<br>*(98.418)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 10th Gear** | | | | | | | | | | | |
| 19.53<br>*(14.56)* | 1484<br>*(6.60)* | 4.94<br>*(7.95)* | 1503 | 4.35 | 1.360<br>*(5.147)* | 0.480<br>*(0.292)* | 14.36<br>*(2.830)* | 179<br>*(81.7)* | 54<br>*(12.2)* | 58<br>*(14.4)* | 28.620<br>*(96.645)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 29.76<br>*(22.19)* | 4144<br>*(18.44)* | 2.69<br>*(4.33)* | 2273 | 14.92 | 6th Gear | | | 181<br>*(82.8)* | 55<br>*(12.8)* | 64<br>*(17.8)* | 28.620<br>*(96.645)* |
| 34.30<br>*(25.58)* | 3733<br>*(16.60)* | 3.45<br>*(5.55)* | 2250 | 13.17 | 7th Gear | | | 184<br>*(84.4)* | 52<br>*(11.1)* | 62<br>*(16.7)* | 29.180<br>*(98.536)* |
| 35.40<br>*(26.39)* | 2936<br>*(13.06)* | 4.52<br>*(7.27)* | 2248 | 9.50 | 8th Gear | | | 184<br>*(84.2)* | 50<br>*(10.0)* | 59<br>*(15.0)* | 29.200<br>*(98.604)* |
| 35.16<br>*(26.22)* | 2293<br>*(10.20)* | 5.75<br>*(9.25)* | 2247 | 7.19 | 9th Gear | | | 184<br>*(84.4)* | 52<br>*(11.1)* | 62<br>*(16.7)* | 29.180<br>*(98.536)* |
| 35.11<br>*(26.18)* | 1808<br>*(8.04)* | 7.28<br>*(11.72)* | 2250 | 5.62 | 10th Gear | | | 184<br>*(84.4)* | 52<br>*(11.1)* | 63<br>*(17.2)* | 29.180<br>*(98.536)* |
| 33.90<br>*(25.28)* | 1358<br>*(6.04)* | 9.36<br>*(15.07)* | 2249 | 4.24 | 11th Gear | | | 184<br>*(84.4)* | 52<br>*(11.1)* | 63<br>*(17.2)* | 29.150<br>*(98.435)* |

**Department of Agricultural Engineering**

**Dates of Test:** October 12-19, 1981

**Manufacturer:** MASSEY FERGUSON S.p.A
LANDINI DIVISION Via Matteotti 17,42042
Fabrico (RE), Italy

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil SAE** 20-20W **API service classification** SB/SE-CA/CC **To motor** 1.485 gal *(5.619 l)* **Drained from motor** 1.140 gal *(4.314 l)* **Transmission and final drive lubricant** MF Permatran fluid **Total time engine was operated** 46.0 hours.

**ENGINE:** **Make** Perkins Diesel **Type** three cylinder vertical **Serial No.** CE21899U627706G **Crankshaft** lengthwise **Rated rpm** 2250 **Bore and stroke** 3.6" × 5.0" *(91.4 mm × 127 mm)* **Compression ratio** 16.5 to 1 **Displacement** 153 cu in *(2502 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** oil bath with centrifugal precleaner **Oil filter** one full flow paper cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** 2227212 **Tread width** rear 55.1" *(1400 mm)* to 74.8" *(1900 mm)* front 59.1" *(1500 mm)* **Wheel base** 81.1" *(2060 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 34.5" *(876 mm)* Vertical distance above roadway 28.9" *(733 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 0.8 *(1.3)* second 1.3 *(2.0)* third 1.6 *(2.6)* fourth 2.0 *(3.2)* fifth 2.5 *(4.0)* sixth 3.1 *(5.0)* seventh 3.9 *(6.3)* eighth 4.9 *(8.0)* ninth 6.1 *(9.9)* tenth 7.6 *(12.3)* eleventh 9.7 *(15.5)* twelfth 15.1 *(24.3)* reverse 2.1 *(3.4)*, 3.3 *(5.3)*, 4.2 *(6.7)*, 6.5 *(10.5)* **Clutch** dry disc operated by foot pedal **Brakes** dry disc operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 156.1" *(3.96 m)* left 160.3" *(4.07 m)* (on concrete surface without brake) right 184.9" *(4.70 m)* left 185.3" *(4.71 m)* **Turning space diameter** (on concrete surface with brake applied) right 323.2" *(8.21 m)* left 331.5" *(8.42 m)* (on concrete surface without brake) right 380.8" *(9.67 m)* left 381.7" *(9.69 m)* **Power take-off** 540 rpm at 1943 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

## LUGGING ABILITY IN 8th GEAR

| Crankshaft Speed rpm | 2248 | 2027 | 1800 | 1577 | 1348 | 1128 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 2936<br>*(13.06)* | 3176<br>*(14.13)* | 3379<br>*(15.03)* | 3531<br>*(15.71)* | 3572<br>*(15.89)* | 3489<br>*(15.52)* |
| Increase in Pull % | 0 | 8 | 15 | 20 | 22 | 19 |
| Power—Hp<br>*(kW)* | 35.40<br>*(26.39)* | 34.06<br>*(25.40)* | 31.93<br>*(23.81)* | 29.01<br>*(21.64)* | 25.02<br>*(18.66)* | 20.53<br>*(15.31)* |
| Speed—Mph<br>*(km/h)* | 4.52<br>*(7.27)* | 4.02<br>*(6.47)* | 3.54<br>*(5.70)* | 3.08<br>*(4.96)* | 2.65<br>*(4.25)* | 2.21<br>*(3.55)* |
| Slip % | 9.50 | 10.69 | 11.40 | 12.10 | 12.20 | 11.90 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 98.5 | 98.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 97.0 |
| 50% of Pull at Maximum Power—Two Hours | | 96.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 93.0 |
| Bystander in 12th gear | | 88.5 |

## DRAWBAR PERFORMANCE (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 8th Gear** | | | | | | | | | | | |
| 35.56<br>*(26.52)* | 2847<br>*(12.67)* | 4.68<br>*(7.54)* | 2250 | 6.28 | 2.520<br>*(9.539)* | 0.489<br>*(0.297)* | 14.11<br>*(2.780)* | 184<br>*(84.2)* | 51<br>*(10.6)* | 65<br>*(18.3)* | 28.930<br>*(97.692)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 29.87<br>*(22.28)* | 5138<br>*(22.85)* | 2.18<br>*(3.51)* | 2273 | 14.93 | 5th Gear | | | 181<br>*(82.8)* | 55<br>*(12.8)* | 62<br>*(16.7)* | 28.610<br>*(96.612)* |
| 36.45<br>*(27.18)* | 2924<br>*(13.00)* | 4.68<br>*(7.52)* | 2251 | 6.48 | 8th Gear | | | 184<br>*(84.4)* | 51<br>*(10.6)* | 61<br>*(16.1)* | 29.190<br>*(98.570)* |

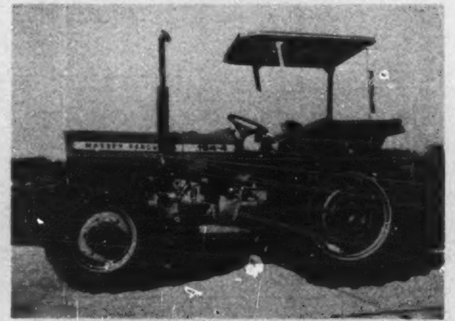
| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 13.6-28; 6; 18 *(125)* | Two 13.6-28; 6; 18 *(125)* |
| Ballast | —Liquid (each) | 463 lb *(210 kg)* | None |
| | —Cast Iron (each) | 305 lb *(138 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 9.5-20; 4; 18 *(125)* | Two 9.5-20; 4; 18 *(125)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 40 lb *(18 kg)* | None |
| Height of Drawbar | | 21.5 in *(545 mm)* | 21.5 in *(545 mm)* |
| Static Weight with Operator | —Rear | 4660 lb *(2114 kg)* | 3125 lb *(1417 kg)* |
| | Front | 2260 lb *(1025 kg)* | 2180 lb *(989 kg)* |
| | Total | 6920 lb *(3139 kg)* | 5305 lb *(2406 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 149°F *(65.0°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1411.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Massey Ferguson MF 154-4 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1412
# STEIGER COUGAR III ST-280 CATERPILLAR DIESEL
# 20 SPEED

## DRAWBAR PERFORMANCE AT 2100 RPM

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | Fuel Consumption lb/hp.hr (kg/kW.h) | Fuel Consumption Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th Gear** | | | | | | | | | | | |
| 238.27<br>(177.68) | 12586<br>(55.99) | 7.10<br>(11.43) | 2097 | 2.67 | 16.044<br>(60.734) | 0.464<br>(0.282) | 14.85<br>(2.926) | 180<br>(81.9) | 35<br>(1.4) | 41<br>(5.0) | 29.325<br>(99.026) |
| **75% of Pull at Maximum Power—Ten Hours 10th Gear** | | | | | | | | | | | |
| 192.43<br>(143.50) | 9715<br>(43.21) | 7.43<br>(11.95) | 2182 | 2.11 | 13.985<br>(52.938) | 0.501<br>(0.305) | 13.76<br>(2.711) | 177<br>(80.4) | 31<br>(−0.6) | 37<br>(2.7) | 29.363<br>(99.134) |
| **50% of Pull at Maximum Power—Two Hours 10th Gear** | | | | | | | | | | | |
| 130.94<br>(97.64) | 6484<br>(28.84) | 7.57<br>(12.19) | 2221 | 1.96 | 11.204<br>(42.411) | 0.590<br>(0.359) | 11.69<br>(2.302) | 177<br>(80.3) | 37<br>(2.8) | 39<br>(3.6) | 28.770<br>(97.152) |
| **50% of Pull at Reduced Engine Speed—Two Hours 15th Gear** | | | | | | | | | | | |
| 130.57<br>(97.36) | 6504<br>(28.93) | 7.53<br>(12.12) | 1175 | 1.88 | 8.448<br>(31.980) | 0.446<br>(0.271) | 15.46<br>(3.045) | 178<br>(80.8) | 40<br>(4.2) | 42<br>(5.3) | 28.720<br>(96.983) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Gear | Temp. °F (°C) Cooling med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 206.52<br>(154.00) | 32099<br>(142.79) | 2.41<br>(3.88) | 2149 | 14.48 | 2nd Gear | 178<br>(80.8) | 33<br>(0.6) | 39<br>(3.9) | 28.780<br>(97.190) |
| 228.65<br>(170.31) | 30484<br>(135.60) | 2.81<br>(4.53) | 2098 | 10.27 | 3rd Gear | 178<br>(80.8) | 34<br>(1.1) | 40<br>(4.4) | 28.780<br>(97.186) |
| 230.90<br>(172.18) | 26431<br>(117.57) | 3.28<br>(5.27) | 2099 | 7.23 | 4th Gear | 180<br>(82.2) | 40<br>(4.4) | 50<br>(10.0) | 29.260<br>(98.807) |
| 239.16<br>(178.34) | 23661<br>(105.25) | 3.79<br>(6.10) | 2099 | 5.78 | 5th Gear | 180<br>(82.2) | 40<br>(4.4) | 50<br>(10.0) | 29.260<br>(98.807) |
| 241.40<br>(180.01) | 20996<br>(93.40) | 4.31<br>(6.94) | 2099 | 4.69 | 6th Gear | 180<br>(82.2) | 40<br>(4.4) | 50<br>(10.0) | 29.270<br>(98.840) |
| 243.31<br>(181.44) | 18458<br>(82.11) | 4.94<br>(7.96) | 2100 | 3.97 | 7th Gear | 180<br>(82.2) | 41<br>(5.0) | 51<br>(10.6) | 29.260<br>(98.807) |
| 243.06<br>(181.25) | 16289<br>(72.46) | 5.60<br>(9.01) | 2098 | 3.32 | 8th Gear | 181<br>(82.8) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |
| 246.13<br>(183.54) | 14686<br>(65.33) | 6.28<br>(10.11) | 2100 | 3.00 | 9th Gear | 181<br>(82.8) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |
| 245.50<br>(183.07) | 12957<br>(57.64) | 7.11<br>(11.43) | 2099 | 2.67 | 10th Gear | 180<br>(82.2) | 38<br>(3.3) | 45<br>(7.2) | 29.310<br>(98.975) |
| 241.51<br>(180.10) | 11177<br>(49.72) | 8.10<br>(13.04) | 2099 | 2.34 | 11th Gear | 181<br>(82.8) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |

## LUGGING ABILITY IN 10th GEAR

| Crankshaft Speed rpm | 2099 | 1889 | 1677 | 1472 | 1258 | 1046 | 840 |
|---|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 12957<br>(57.64) | 15175<br>(67.49) | 16883<br>(75.10) | 18111<br>(80.56) | 18754<br>(83.42) | 18913<br>(84.13) | 17028<br>(75.74) |
| Increase in Pull % | 0 | 17 | 30 | 40 | 45 | 46 | 31 |
| Power—Hp (kW) | 245.50<br>(183.07) | 257.39<br>(191.94) | 253.23<br>(188.83) | 237.78<br>(177.31) | 209.85<br>(156.48) | 175.87<br>(131.15) | 127.82<br>(95.31) |
| Speed—Mph (km/h) | 7.11<br>(11.43) | 6.36<br>(10.24) | 5.62<br>(9.05) | 4.92<br>(7.92) | 4.20<br>(6.76) | 3.49<br>(5.61) | 2.81<br>(4.53) |
| Slip % | 2.67 | 3.16 | 3.49 | 3.65 | 3.97 | 4.13 | 3.65 |

| TRACTOR SOUND LEVEL WITH CAB | 1700 RPM dB(A) | 2100RPM dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 77.0 | 77.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 78.0 |
| 50% of Pull at Maximum Power—Two Hours | | 77.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 76.0 |
| Bystander in 18th gear | | 90.0 |

**Department of Agricultural Engineering**

**Dates of Test:** October 19-30, 1981

**Manufacturer:** STEIGER TRACTOR, INC., 1701 Westview Drive, Fargo, North Dakota 58105

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 4[illegible].3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil** SAE 15W-40 **API service classification** CC [illegible]D SE **To motor** 7.684 gal *(29.087 l)* **Drained from motor** 6.504 gal *(24.621 l)* **Transmission and hydraulic lubricant** SAE 10 hydraulic oil **Final drive lubricant** SAE 85W90 **Total time engine was operated** 45.0 hours.

**ENGINE:** **Make** Caterpillar Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 90U 15983 **Crankshaft** lengthwise **Rated rpm** 1700 to 2100 **Bore and stroke** 5.4" × 6.5" *(137 mm × 165 mm)* **Compression ratio** 14.5 to 1 **Displacement** 893 cu in *(14634 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic oil, radiator for transmission and transfer case oil **Fuel filter** one paper cartridge **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** four wheel drive with duals **Serial No.** 111-00005 81 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 128" *(3251 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 76.0" *(1930 mm)* Vertical distance above roadway 45.5" *(1156 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 2.3 *(3.8)* second 2.6 *(4.2)* third 3.0 *(4.8)* fourth 3.4 *(5.4)* fifth 3.8 *(6.2)* sixth 4.3 *(7.0)* seventh 4.9 *(7.9)* eighth 5.5 *(8.9)* ninth 6.2 *(10.0)* tenth 7.0 *(11.2)* eleventh 7.9 *(12.7)* twelfth 8.9 *(14.3)* thirteenth 10.2 *(16.5)* fourteenth 11.5 *(18.6)* fifteenth 13.1 *(21.1)* sixteenth 14.7 *(23.7)* seventeenth 16.0 *(25.7)* eighteenth 18.0 *(28.9)* nineteenth 20.5 *(33.0)* twentieth 23.1 *(37.1)* reverse 2.3 *(3.8)*, 2.6 *(4.2)*, 3.0 *(4.8)*, 3.4 *(5.4)* **Clutch** dual dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 283" *(7.19 m)* left 288" *(7.32 m)* **Turning space diameter** (on concrete surface without brake) right 590" *(14.99 m)* left 600" *(15.24 m)* **Power take-off** none.

## DRAWBAR PERFORMANCE AT 1700 RPM

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | Fuel Consumption lb/hp.hr (kg/kW.h) | Fuel Consumption Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th Gear** | | | | | | | | | | | |
| 247.27<br>(184.39) | 16278<br>(72.41) | 5.70<br>(9.17) | 1700 | 3.65 | 15.065<br>(57.028) | 0.420<br>(0.256) | 16.41<br>(3.233) | 180<br>(82.2) | 44<br>(6.7) | 49<br>(9.4) | 28.950<br>(97.760) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Gear | Temp. °F (°C) Cooling med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 228.98<br>(170.75) | 32462<br>(144.40) | 2.65<br>(4.26) | 1849 | 14.93 | 4th Gear | 179<br>(81.7) | 36<br>(2.2) | 42<br>(5.6) | 28.770<br>(97.152) |
| 237.45<br>(177.07) | 30378<br>(135.13) | 2.93<br>(4.72) | 1700 | 10.06 | 5th Gear | 178<br>(81.1) | 35<br>(1.7) | 41<br>(5.0) | 28.770<br>(97.152) |
| 240.94<br>(179.67) | 26510<br>(117.92) | 3.41<br>(5.49) | 1701 | 7.08 | 6th Gear | 181<br>(82.8) | 40<br>(4.4) | 50<br>(10.0) | 29.270<br>(98.840) |
| 245.69<br>(183.21) | 23397<br>(104.08) | 3.94<br>(6.34) | 1701 | 5.47 | 7th Gear | 181<br>(82.8) | 41<br>(5.0) | 51<br>(10.6) | 29.260<br>(98.807) |
| 247.19<br>(184.33) | 20701<br>(92.08) | 4.48<br>(7.21) | 1702 | 4.77 | 8th Gear | 182<br>(83.1) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |
| 251.93<br>(187.86) | 18755<br>(83.43) | 5.04<br>(8.11) | 1700 | 4.15 | 9th Gear | 182<br>(83.1) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |
| 252.69<br>(188.43) | 16638<br>(74.01) | 5.70<br>(9.17) | 1699 | 3.49 | 10th Gear | 180<br>(82.2) | 39<br>(3.9) | 48<br>(8.9) | 29.270<br>(98.840) |
| 253.72<br>(189.20) | 14609<br>(64.99) | 6.51<br>(10.48) | 1700 | 3.00 | 11th Gear | 182<br>(83.1) | 40<br>(4.4) | 48<br>(8.9) | 29.260<br>(98.807) |
| 250.67<br>(186.92) | 12763<br>(56.77) | 7.36<br>(11.85) | 1698 | 2.67 | 12th Gear | 180<br>(82.2) | 40<br>(4.4) | 50<br>(10.0) | 29.270<br>(98.840) |
| 252.09<br>(187.98) | 11163<br>(49.66) | 8.47<br>(13.63) | 1701 | 2.42 | 13th Gear | 180<br>(82.2) | 41<br>(5.0) | 51<br>(10.6) | 29.260<br>(98.807) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 81 lb *(37 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each inner) | 1190 lb *(540 kg)* | None |
| | —Cast Iron (each) | None | None |
| Height of Drawbar | | 17.5 in *(445 mm)* | 17.5 in *(445 mm)* |
| Static Weight with Operator | —Rear | 12585 lb *(5708 kg)* | 12260 lb *(5561 kg)* |
| | Front | 20760 lb *(9417 kg)* | 18380 lb *(8337 kg)* |
| | Total | 33345 lb *(15125 kg)* | 30640 lb *(13898 kg)* |

**REPAIRS and ADJUSTMENTS:** During preliminary drawbar tests, the fuel shut off system malfunctioned. Test continued after repair.

**REMARKS:** All test results were determined from observed data obtained in accordance with current SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 140°F *(60.0°C)*. Ten gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1412.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
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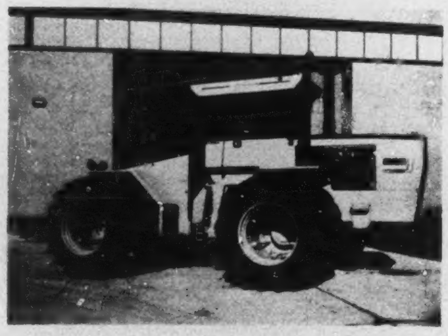


**Steiger Cougar III ST-280 Caterpillar Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1413
# STEIGER COUGAR III PTA-280 CATERPILLAR DIESEL
# 10 SPEED

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | Fuel Consumption lb/hp.hr *(kg/kW.h)* | Fuel Consumption Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th (4L) Gear** | | | | | | | | | | | |
| 231.61<br>*(172.71)* | 15507<br>*(68.98)* | 5.60<br>*(9.01)* | 2099 | 3.31 | 16.262<br>*(61.558)* | 0.484<br>*(0.294)* | 14.24<br>*(2.806)* | 180<br>*(81.9)* | 49<br>*(9.4)* | 56<br>*(13.1)* | 28.940<br>*(97.726)* |
| **75% of Pull at Maximum Power—Ten Hours 5th (4L) Gear** | | | | | | | | | | | |
| 186.72<br>*(139.24)* | 11878<br>*(52.84)* | 5.89<br>*(9.49)* | 2189 | 2.43 | 14.213<br>*(53.803)* | 0.525<br>*(0.319)* | 13.14<br>*(2.588)* | 178<br>*(81.1)* | 53<br>*(11.8)* | 63<br>*(17.3)* | 28.866<br>*(97.476)* |
| **50% of Pull at Maximum Power—Two Hours 5th (4L) Gear** | | | | | | | | | | | |
| 127.62<br>*(95.16)* | 7920<br>*(35.23)* | 6.04<br>*(9.72)* | 2225 | 1.62 | 11.403<br>*(43.166)* | 0.616<br>*(0.375)* | 11.19<br>*(2.205)* | 179<br>*(81.7)* | 56<br>*(13.1)* | 67<br>*(19.4)* | 28.910<br>*(97.625)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th (2H) Gear** | | | | | | | | | | | |
| 127.68<br>*(95.21)* | 7924<br>*(35.25)* | 6.04<br>*(9.72)* | 1545 | 1.74 | 8.974<br>*(33.970)* | 0.485<br>*(0.295)* | 14.23<br>*(2.803)* | 177<br>*(80.6)* | 54<br>*(11.9)* | 59<br>*(14.7)* | 28.710<br>*(96.949)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 149.98<br>*(111.84)* | 32085<br>*(142.72)* | 1.75<br>*(2.82)* | 2197 | 14.73 | 1st (1L) Gear | 178<br>*(80.8)* | 47<br>*(8.3)* | 50<br>*(10.0)* | 28.760<br>*(97.118)* |
| 224.19<br>*(167.18)* | 24761<br>*(110.14)* | 3.40<br>*(5.46)* | 2099 | 6.39 | 2nd (2L) Gear | 182<br>*(83.3)* | 56<br>*(13.3)* | 68<br>*(20.0)* | 28.910<br>*(97.625)* |
| 224.55<br>*(167.45)* | 19460<br>*(86.56)* | 4.33<br>*(6.96)* | 2098 | 4.28 | 3rd (1H) Gear | 183<br>*(83.9)* | 56<br>*(13.3)* | 69<br>*(20.6)* | 28.920<br>*(97.659)* |
| 232.96<br>*(173.72)* | 19943<br>*(88.71)* | 4.38<br>*(7.05)* | 2100 | 4.44 | 4th (3L) Gear | 182<br>*(83.1)* | 55<br>*(12.8)* | 66<br>*(18.9)* | 28.920<br>*(97.659)* |
| 236.40<br>*(176.28)* | 15813<br>*(70.34)* | 5.61<br>*(9.02)* | 2101 | 3.31 | 5th (4L) Gear | 182<br>*(83.1)* | 54<br>*(12.2)* | 65<br>*(18.3)* | 28.930<br>*(97.692)* |
| 236.55<br>*(176.39)* | 12538<br>*(55.77)* | 7.07<br>*(11.39)* | 2099 | 2.41 | 6th (5L) Gear | 182<br>*(83.1)* | 55<br>*(12.8)* | 67<br>*(19.4)* | 28.920<br>*(97.659)* |
| 233.58<br>*(174.18)* | 10705<br>*(47.62)* | 8.18<br>*(13.17)* | 2100 | 1.99 | 7th (2H) Gear | 182<br>*(83.3)* | 56<br>*(13.3)* | 68<br>*(20.0)* | 28.920<br>*(97.659)* |

## LUGGING ABILITY IN 5th (4L) GEAR

| Crankshaft Speed rpm | 2101 | 1888 | 1681 | 1470 |
|---|---|---|---|---|
| Pull—lbs *(kN)* | 15813<br>*(70.34)* | 18365<br>*(81.69)* | 20381<br>*(90.66)* | 21977<br>*(97.76)* |
| Increase in Pull % | 0 | 16 | 29 | 39 |
| Power—Hp *(kW)* | 236.40<br>*(176.28)* | 244.98<br>*(182.68)* | 240.48<br>*(179.32)* | 225.62<br>*(168.24)* |
| Speed—Mph *(km/h)* | 5.61<br>*(9.02)* | 5.00<br>*(8.05)* | 4.42<br>*(7.12)* | 3.85<br>*(6.20)* |
| Slip % | 3.31 | 4.12 | 4.80 | 5.07 |

At 1460 RPM the automatic transmission shifted down to 4th (3L) gear and the test was terminated.

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 76.5 |
| 75% of Pull at Maximum Power—Ten Hours | 77.0 |
| 50% of Pull at Maximum Power—Two Hours | 77.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 75.0 |
| Bystander in 10th (5H) gear | 96.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(93)* outer 12 *(83)* | Four 23.1-34; 8; inner 14 *(93)* outer 12 *(83)* |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 80 lb *(36 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(93)* outer 12 *(83)* | Four 23.1-34; 8; inner 14 *(93)* outer 12 *(83)* |
| Ballast | —Liquid (each inner) | 1025 lb *(465 kg)* | None |
| | —Cast Iron (each) | None | None |
| Height of Drawbar | | 17.5 in *(445 mm)* | 17.5 in *(445 mm)* |
| Static Weight with Operator | —Rear | 13120 lb *(5951 kg)* | 12800 lb *(5806 kg)* |
| | Front | 20030 lb *(9086 kg)* | 17980 lb *(8156 kg)* |
| | Total | 33150 lb *(15037 kg)* | 30780 lb *(13962 kg)* |

**Department of Agricultural Engineering**

**Dates of Test:** October 21-November 3, 1981

**Manufacturer:** STEIGER TRACTOR, INC., 1701 Westview Drive, Fargo, North Dakota 58103

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil SAE** 15W-40 **API service classification** CC CD SE **To motor** 7.296 gal *(27.618 l)* **Drained from motor** 6.094 gal *(23.068 l)* **Transmission lubricant** hydraulic transmission fluid type C-3 (Dextron) **Transfer case lubricant** 303 or equivalent **Hydraulic oil** SAE 10 hydraulic oil, 303 or equivalent **Final drive lubricant** 85W 90 **Total time engine was operated** 31.5 hours.

**ENGINE:** **Make** Caterpillar Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 90U15964 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.4" × 6.5" *(137 mm × 165 mm)* **Compression ratio** 14.5 to 1 **Displacement** 893 cu in *(14634 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** separate engine coolant heat exchangers for crankcase oil and transmission oil, separate radiators for hydraulic and transfer case oil **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** four wheel drive with duals **Serial No.** 155-00002 81 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 132.5" *(3365 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 77.4" *(1966 mm)* Vertical distance above roadway 45.5" *(1156 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with automatic power-shift and torque convertor lockup **Advertised speeds mph (km/h)** first 1.9 *(3.0)* second 3.4 *(5.6)* third 4.3 *(6.9)* fourth 4.4 *(7.0)* fifth 5.5 *(8.9)* sixth 6.9 *(11.1)* seventh 7.9 *(12.8)* eighth 10.0 *(16.2)* ninth 12.7 *(20.4)* tenth 15.9 *(25.6)* reverse 2.4 *(3.8)*, 5.4 *(8.7)* **Clutch** none **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 257" *(6.53 m)* left 261.5" *(6.64 m)* **Turning space diameter** (on concrete surface without brake) right 537" *(13.64 m)* left 546" *(13.87 m)* **Power take-off** none.

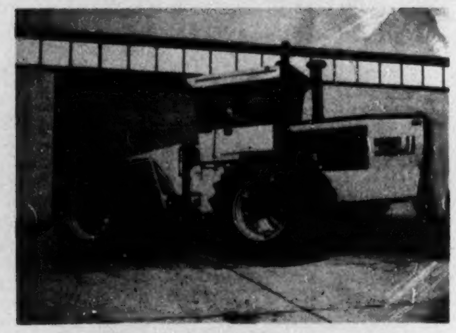
**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 158°F *(70.0°C)* Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1413.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



**Steiger Cougar III PTA-280 Caterpillar Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1414
# STEIGER BEARCAT III ST-225 DIESEL
# 20 SPEED
# (SERIAL NUMBERS 109-00328 and HIGHER)

## DRAWBAR PERFORMANCE AT 2100 RPM

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption | | | Temp. °F (°C) | | | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Cool-ing med | Air wet bulb | Air dry bulb | |
| **Maximum Available Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 186.21 *(138.86)* | 11254 *(50.06)* | 6.20 *(9.99)* | 2099 | 2.54 | 13.307 *(50.372)* | 0.493 *(0.300)* | 13.99 *(2.757)* | 177 *(80.6)* | 60 *(15.6)* | 69 *(20.6)* | 28.585 *(96.527)* |
| **75% of Pull at Maximum Power—Ten Hours 11th Gear** | | | | | | | | | | | |
| 153.50 *(114.47)* | 8903 *(39.60)* | 6.47 *(10.41)* | 2179 | 2.18 | 11.338 *(42.919)* | 0.509 *(0.310)* | 13.54 *(2.667)* | 176 *(79.8)* | 48 *(9.0)* | 59 *(15.0)* | 29.190 *(98.570)* |
| **50% of Pull at Maximum Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 105.18 *(78.43)* | 5953 *(26.48)* | 6.63 *(10.66)* | 2222 | 1.70 | 9.028 *(34.176)* | 0.592 *(0.360)* | 11.65 *(2.295)* | 176 *(79.7)* | 55 *(12.5)* | 55 *(12.8)* | 29.020 *(97.996)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 16th Gear** | | | | | | | | | | | |
| 104.25 *(77.72)* | 5936 *(26.41)* | 6.58 *(10.60)* | 1186 | 1.66 | 7.125 *(26.970)* | 0.471 *(0.287)* | 14.63 *(2.882)* | 174 *(78.6)* | 57 *(13.9)* | 58 *(14.4)* | 29.040 *(98.064)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 161.79 *(120.64)* | 28805 *(128.13)* | 2.11 *(3.39)* | 2159 | 14.92 | 3rd Gear | | | 179 *(81.7)* | 48 *(8.9)* | 49 *(9.4)* | 28.900 *(97.591)* |
| 176.52 *(131.63)* | 28313 *(125.94)* | 2.34 *(3.76)* | 2101 | 13.83 | 4th Gear | | | 178 *(81.1)* | 45 *(7.2)* | 46 *(7.8)* | 28.910 *(97.625)* |
| 186.28 *(138.91)* | 24368 *(108.39)* | 2.87 *(4.61)* | 2100 | 7.80 | 5th Gear | | | 177 *(80.6)* | 59 *(15.0)* | 64 *(17.8)* | 28.890 *(97.557)* |
| 191.57 *(142.86)* | 21865 *(97.26)* | 3.29 *(5.29)* | 2099 | 6.06 | 6th Gear | | | 177 *(80.6)* | 59 *(15.0)* | 64 *(17.8)* | 28.880 *(97.523)* |
| 195.03 *(145.43)* | 19475 *(86.62)* | 3.76 *(6.04)* | 2101 | 4.97 | 7th Gear | | | 178 *(80.8)* | 60 *(15.6)* | 65 *(18.3)* | 28.860 *(97.456)* |
| 195.51 *(145.79)* | 17225 *(76.61)* | 4.26 *(6.85)* | 2096 | 4.17 | 8th Gear | | | 177 *(80.6)* | 60 *(15.6)* | 65 *(18.3)* | 28.840 *(97.388)* |
| 196.25 *(146.34)* | 15239 *(67.79)* | 4.83 *(7.77)* | 2100 | 3.53 | 9th Gear | | | 177 *(80.6)* | 60 *(15.6)* | 66 *(18.9)* | 28.820 *(97.321)* |
| 197.69 *(147.42)* | 13562 *(60.33)* | 5.47 *(8.80)* | 2100 | 3.12 | 10th Gear | | | 178 *(80.8)* | 59 *(15.0)* | 65 *(18.3)* | 28.810 *(97.287)* |
| 195.82 *(146.02)* | 11855 *(52.73)* | 6.19 *(9.97)* | 2099 | 2.79 | 11th Gear | | | 178 *(80.8)* | 58 *(14.4)* | 63 *(17.2)* | 28.760 *(97.118)* |
| 195.58 *(145.84)* | 10483 *(46.63)* | 7.00 *(11.26)* | 2097 | 2.37 | 12th Gear | | | 178 *(81.1)* | 59 *(15.0)* | 64 *(17.8)* | 28.780 *(97.186)* |
| 193.11 *(144.00)* | 8919 *(39.67)* | 8.12 *(13.07)* | 2101 | 1.96 | 13th Gear | | | 178 *(80.8)* | 59 *(15.0)* | 64 *(17.8)* | 28.790 *(97.220)* |

## LUGGING ABILITY IN 11th GEAR

| Crankshaft Speed rpm | 2099 | 1889 | 1678 | 1469 | 1260 | 1054 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 11855 *(52.73)* | 13367 *(59.46)* | 14377 *(63.95)* | 15683 *(69.76)* | 15564 *(69.23)* | 14424 *(64.16)* |
| Increase in Pull % | 0 | 13 | 21 | 32 | 31 | 22 |
| Power—Hp *(kW)* | 195.82 *(146.02)* | 197.97 *(147.62)* | 188.52 *(140.58)* | 179.55 *(133.88)* | 152.74 *(113.90)* | 118.76 *(88.56)* |
| Speed—Mph *(km/h)* | 6.19 *(9.97)* | 5.55 *(8.94)* | 4.92 *(7.92)* | 4.29 *(6.91)* | 3.68 *(5.92)* | 3.09 *(4.97)* |
| Slip % | 2.79 | 2.95 | 3.28 | 3.61 | 3.61 | 3.44 |

| TRACTOR SOUND LEVEL WITH CAB | 1700 RPM dB(A) | 2100RPM dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 77.0 | 77.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 77.5 |
| 50% of Pull at Maximum Power—Two Hours | | 76.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 74.5 |
| Bystander in 19th gear | | 98.0 |

**Department of Agricultural Engineering**

**Dates of Test:** October 19 to November 4, 1981

**Manufacturer:** STEIGER TRACTOR, INC.,
1701 Westview Drive, Fargo, North Dakota
58103

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil SAE** 15W-40 **API service classification** CC CD SE **To motor** 5.736 gal *(21.713 l)* **Drained from motor** 4.682 gal *(17.722 l)* **Transmission and hydraulic lubricant** SAE 10 hydraulic oil **Final drive lubricant** SAE 85W90 **Total time engine was operated** 37.0 hours.

**ENGINE: Make** Caterpillar Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 64Z00412 **Crankshaft** lengthwise **Rated rpm** 1700 to 2100 **Bore and stroke** 4.75" × 6.0" *(120.6 mm × 152.4 mm)* **Compression ratio** 15.0 to 1 **Displacement** 638 cu in *(10455 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic oil, radiator for transmission and transfer case oil **Fuel filter** one paper cartridge **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** four wheel drive with duals **Serial No.** 109-00349 81 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 128" *(3251 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 71.9" *(1826 mm)* Vertical distance above roadway 44.6" *(1132 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 1.8 *(2.9)* second 2.0 *(3.3)* third 2.3 *(3.7)* fourth 2.6 *(4.2)* fifth 3.0 *(4.8)* sixth 3.3 *(5.4)* seventh 3.8 *(6.1)* eighth 4.2 *(6.8)* ninth 4.8 *(7.7)* tenth 5.4 *(8.6)* eleventh 6.1 *(9.8)* twelfth 6.8 *(11.0)* thirteenth 7.9 *(12.7)* fourteenth 8.8 *(14.2)* fifteenth 10.1 *(16.2)* sixteenth 11.3 *(18.1)* seventeenth 12.6 *(20.3)* eighteenth 14.1 *(22.7)* nineteenth 16.0 *(25.8)* twentieth 17.9 *(28.8)* reverse 1.8 *(2.9)*, 2.0 *(3.3)*, 2.3 *(3.7)*, 2.6 *(4.2)* **Clutch** dual dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 283" *(7.19 m)* left 288" *(7.32 m)* **Turning space diameter** (on concrete surface without brake) right 590" *(14.99 m)* left 600" *(15.24 m)* **Power take-off** none.

## DRAWBAR PERFORMANCE AT 1700 RPM

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption | | | Temp. °F (°C) | | | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Cool-ing med | Air wet bulb | Air dry bulb | |
| **Maximum Available Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 184.69 *(137.73)* | 13888 *(61.78)* | 4.99 *(8.03)* | 1701 | 3.32 | 11.965 *(45.293)* | 0.447 *(0.272)* | 15.44 *(3.041)* | 176 *(80.0)* | 57 *(13.9)* | 62 *(16.7)* | 28.730 *(97.017)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 173.51 *(129.39)* | 28595 *(127.19)* | 2.28 *(3.66)* | 1803 | 14.73 | 5th Gear | | | 178 *(81.1)* | 46 *(7.8)* | 47 *(8.3)* | 28.910 *(97.625)* |
| 177.69 *(132.50)* | 25818 *(114.84)* | 2.58 *(4.15)* | 1701 | 8.90 | 6th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 64 *(17.8)* | 28.890 *(97.557)* |
| 183.42 *(136.77)* | 23021 *(102.40)* | 2.99 *(4.81)* | 1700 | 6.52 | 7th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 65 *(18.3)* | 28.870 *(97.490)* |
| 185.56 *(138.37)* | 20441 *(90.93)* | 3.40 *(5.48)* | 1697 | 5.36 | 8th Gear | | | 176 *(80.0)* | 60 *(15.6)* | 65 *(18.3)* | 28.850 *(97.422)* |
| 188.88 *(140.85)* | 18306 *(81.43)* | 3.87 *(6.23)* | 1699 | 4.57 | 9th Gear | | | 176 *(80.0)* | 60 *(15.6)* | 66 *(18.9)* | 28.830 *(97.355)* |
| 189.85 *(141.57)* | 16212 *(72.11)* | 4.39 *(7.07)* | 1700 | 3.93 | 10th Gear | | | 176 *(80.0)* | 60 *(15.6)* | 66 *(18.9)* | 28.810 *(97.287)* |
| 189.51 *(141.32)* | 14278 *(63.51)* | 4.98 *(8.01)* | 1698 | 3.28 | 11th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 64 *(17.8)* | 28.770 *(97.152)* |
| 189.44 *(141.27)* | 12601 *(56.05)* | 5.64 *(9.07)* | 1699 | 2.87 | 12th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 64 *(17.8)* | 28.780 *(97.186)* |
| 189.85 *(141.57)* | 10888 *(48.43)* | 6.54 *(10.52)* | 1700 | 2.37 | 13th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 65 *(18.3)* | 28.790 *(97.220)* |
| 190.64 *(142.16)* | 9673 *(43.03)* | 7.39 *(11.89)* | 1700 | 2.04 | 14th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 65 *(18.3)* | 28.800 *(97.253)* |
| 187.92 *(140.13)* | 8423 *(37.47)* | 8.37 *(13.46)* | 1700 | 1.87 | 15th Gear | | | 176 *(80.0)* | 59 *(15.0)* | 65 *(18.3)* | 28.800 *(97.253)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 54 lb *(25 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(85)* |
| Ballast | —Liquid (each inner) | None | None |
| | —Test equip. (each) | 62 lb *(28 kg)* | None |
| Height of Drawbar | | 18 in *(455 mm)* | 18 in *(455 mm)* |
| Static Weight with Operator—Rear | | 12815 lb *(5813 kg)* | 12600 lb *(5715 kg)* |
| Front | | 17190 lb *(7797 kg)* | 16940 lb *(7684 kg)* |
| Total | | 30005 lb *(13610 kg)* | 29540 lb *(13399 kg)* |

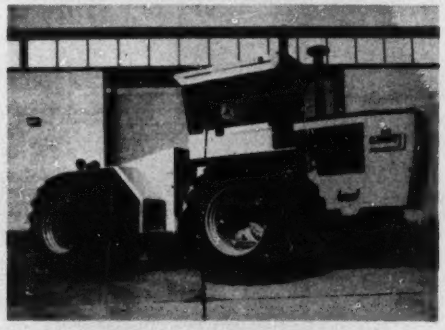
**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 131°F *(55.0°C)* Eleven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to tractor chassis Serial No. 109-00328 and higher.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1414.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



**Steiger Bearcat III ST-225 Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1415 — LONG 510 DIESEL
## 8 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crankshaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—600 rpm)** | | | | | | | | |
| 49.15<br>(36.65) | 2400 | 3.242<br>(12.272) | 0.455<br>(0.277) | 15.16<br>(2.986) | 205<br>(96.2) | 58<br>(14.2) | 75<br>(23.9) | 29.043<br>(98.075) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 46.91<br>(34.98) | 2160 | 2.981<br>(11.284) | 0.438<br>(0.267) | 15.74<br>(3.100) | 205<br>(96.1) | 57<br>(13.7) | 75<br>(23.9) | 29.065<br>(98.148) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 42.55<br>(31.73) | 2445 | 2.654<br>(10.046) | 0.430<br>(0.262) | 16.03<br>(3.158) | 192<br>(88.9) | 56<br>(13.1) | 75<br>(23.6) | ......<br>...... |
| 0.00<br>(0.00) | 2531 | 0.818<br>(3.096) | .....<br>..... | .....<br>..... | 174<br>(78.9) | 56<br>(13.1) | 75<br>(23.9) | ......<br>...... |
| 21.68<br>(16.17) | 2492 | 1.614<br>(6.110) | 0.513<br>(0.312) | 13.43<br>(2.646) | 180<br>(82.2) | 56<br>(13.1) | 75<br>(23.6) | ......<br>...... |
| 49.54<br>(36.94) | 2400 | 3.281<br>(12.420) | 0.457<br>(0.278) | 15.10<br>(2.974) | 201<br>(93.9) | 56<br>(13.3) | 76<br>(24.2) | ......<br>...... |
| 10.93<br>(8.15) | 2511 | 1.175<br>(4.448) | 0.741<br>(0.451) | 9.30<br>(1.832) | 179<br>(81.4) | 55<br>(12.8) | 75<br>(23.9) | ......<br>...... |
| 32.20<br>(24.01) | 2466 | 2.095<br>(7.923) | 0.448<br>(0.273) | 15.38<br>(3.030) | 182<br>(83.3) | 55<br>(12.8) | 76<br>(24.2) | ......<br>...... |
| Av 26.15<br>Av (19.50) | 2474 | 1.939<br>(7.340) | 0.511<br>(0.311) | 13.48<br>(2.657) | 184<br>(84.7) | 56<br>(13.6) | 75<br>(23.9) | 29.083<br>(98.249) |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 41.73<br>(31.12) | 3046<br>(13.55) | 5.14<br>(8.27) | 2399 | 6.70 | 3.173<br>(12.010) | 0.534<br>(0.319) | 13.15<br>(2.591) | 183<br>(83.6) | 49<br>(9.2) | 59<br>(15.0) | 29.145<br>(98.418) |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 34.18<br>(25.49) | 2369<br>(10.54) | 5.41<br>(8.71) | 2479 | 4.94 | 2.527<br>(9.566) | 0.510<br>(0.310) | 13.52<br>(2.664) | 176<br>(79.9) | 48<br>(8.8) | 57<br>(13.8) | 29.027<br>(98.020) |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 23.53<br>(17.55) | 1590<br>(7.07) | 5.55<br>(8.93) | 2505 | 3.56 | 1.922<br>(7.274) | 0.563<br>(0.343) | 12.24<br>(2.412) | 173<br>(78.3) | 45<br>(7.3) | 51<br>(10.3) | 29.000<br>(97.929) |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 23.45<br>(17.49) | 1583<br>(7.04) | 5.56<br>(8.94) | 1666 | 3.46 | 1.632<br>(6.176) | 0.480<br>(0.292) | 14.37<br>(2.831) | 173<br>(78.3) | 51<br>(10.3) | 60<br>(15.3) | 28.955<br>(97.727) |

### MAXIMUM POWER IN SELECTED GEARS

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32.44<br>(24.19) | 6040<br>(26.87) | 2.01<br>(3.24) | 2409 | 14.98 | | 2nd Gear | | 171<br>(77.2) | 40<br>(4.4) | 43<br>(6.1) | 28.990<br>(97.891) |
| 40.81<br>(30.43) | 5211<br>(23.18) | 2.94<br>(4.73) | 2398 | 12.84 | | 3rd Gear | | 180<br>(81.9) | 48<br>(8.9) | 58<br>(14.4) | 29.170<br>(98.503) |
| 41.95<br>(31.28) | 3971<br>(17.66) | 3.96<br>(6.38) | 2400 | 9.06 | | 4th Gear | | 182<br>(83.1) | 48<br>(8.9) | 59<br>(15.0) | 29.166<br>(98.469) |
| 43.27<br>(32.26) | 3154<br>(14.03) | 5.14<br>(8.28) | 2400 | 6.56 | | 5th Gear | | 179<br>(81.7) | 47<br>(8.3) | 55<br>(12.8) | 29.180<br>(98.536) |
| 42.70<br>(31.84) | 2018<br>(8.98) | 7.95<br>(12.77) | 2400 | 4.28 | | 6th Gear | | 182<br>(83.3) | 48<br>(8.9) | 59<br>(15.0) | 29.180<br>(98.499) |

### LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2400 | 2165 | 1914 | 1685 | 1446 | 1194 | 956 |
|---|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 3154<br>(14.03) | 3340<br>(14.86) | 3468<br>(15.43) | 3572<br>(15.89) | 3635<br>(16.17) | 3635<br>(16.17) | 3381<br>(15.04) |
| Increase in Pull % | 0 | 6 | 10 | 13 | 15 | 15 | 7 |
| Power—Hp (kW) | 43.27<br>(32.26) | 41.10<br>(30.65) | 37.61<br>(28.05) | 34.00<br>(25.35) | 29.65<br>(22.11) | 24.45<br>(18.23) | 18.34<br>(13.67) |
| Speed—Mph (km/h) | 5.14<br>(8.28) | 4.61<br>(7.43) | 4.07<br>(6.55) | 3.57<br>(5.74) | 3.06<br>(4.92) | 2.52<br>(4.06) | 2.03<br>(3.27) |
| Slip % | 6.56 | 7.15 | 7.48 | 7.60 | 7.91 | 8.02 | 7.24 |

**Department of Agricultural Engineering**

**Dates of Test:** October 29 to November 14, 1981

**Manufacturer:** UNIVERSAL TRACTOR BRASOV (UTB) Brasov, Romania

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil** Long engine oil **SAE** 15W-40 **API service classification** SF-CD **To motor** 2.088 gal *(7.904 l)* **Drained from motor** 1.603 gal *(6.067 l)* **Transmission lubricant** Exxon torque fluid 56 or equiv. **Final drive lubricant** SAE 90 gearlube **Total time engine was operated** 43.5 hours

**ENGINE:** **Make** UTB diesel **Type** three cylinder vertical **Serial No.** D-115.050X003637 **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.02" × 4.33" *(102 mm × 110 mm)* **Compression ratio** 17 to 1 **Displacement** 164.5 cu in *(2697 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** oil bath with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** 415334 **Tread width** rear 52.2" *(1327 mm)* to 76.3" *(1937 mm)* front 50.4"*(1280 mm)* to 77.5" *(1969 mm)* **Wheel base** 76" *(1930 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 26.8" *(680 mm)* Vertical distance above roadway 28" *(711 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.5 *(2.5)* second 2.3 *(3.7)* third 3.4 *(5.4)* fourth 4.3 *(7.0)* fifth 5.5 *(8.8)* sixth 8.3 *(13.3)* seventh 12.1 *(19.5)* eighth 15.6 *(25.2)* reverse 2.2 *(3.5)*, 7.9 *(12.7)* **Clutch** dual plate dry disc operated by foot pedal **Brakes** contracting band operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 109" *(2.77 m)* left 109" *(2.77 m)* (on concrete surface without brake) right 124" *(3.15 m)* left 124" *(3.15 m)* **Turning space diameter** (on concrete surface with brake applied) right 225" *(5.71 m)* left 225" *(5.71 m)* (on concrete surface without brake) right 255" *(6.48 m)* left 255" *(6.48 m)* **Power take-off** 540 rpm at 2100 engine rpm.

**REPAIRS and ADJUSTMENTS:** The left rear axle oil seal was replaced after break-in period. Missing air baffles above radiator were installed during preliminary PTO test. The throttle lever friction disc was tightened after the PTO test.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 155°F *(68.2°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 100.0 |
| 75% of Pull at Maximum Power—Ten Hours | 98.0 |
| 50% of Pull at Maximum Power—Two Hours | 96.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 93.5 |
| Bystander in 8th gear | 89.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 14.9-28; 6; 20 (140) | Two 14.9-28; 6; 20 (140) |
| Ballast | —Liquid (each) | 680 lb (308 kg) | None |
| | —Cast Iron (each) | 815 lb (370 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 7.50-16; 6; 28 (195) | Two 7.50-16; 6; 28 (195) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 468 lb (212 kg) | None |
| Height of Drawbar | | 20.5 in (520 mm) | 20.5 in (520 mm) |
| Static Weight with Operator—Rear | | 5815 lb (2638 kg) | 2825 lb (1281 kg) |
| —Front | | 2395 lb (1086 kg) | 1460 lb (662 kg) |
| —Total | | 8210 lb (3724 kg) | 4285 lb (1943 kg) |

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1415.

LOUIS I. LEVITICUS
Engineer-in Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

Long 510 Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1416 — LONG 510 DTC DIESEL
## 8 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| *Rated Engine Speed—Two Hours (PTO Speed—600 rpm)* | | | | | | | | |
| 49.35 (36.80) | 2400 | 3.077 (11.648) | 0.430 (0.261) | 16.04 (3.159) | 214 (101.1) | 54 (12.3) | 75 (24.0) | 28.920 (97.940) |
| *Standard Power Take-off Speed (540 rpm)—One Hour* | | | | | | | | |
| 46.41 (34.61) | 2160 | 2.818 (10.667) | 0.418 (0.255) | 16.47 (3.245) | 214 (100.9) | 55 (12.7) | 75 (23.8) | 28.905 (97.878) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 43.41 (32.37) | 2464 | 2.668 (10.099) | 0.424 (0.258) | 16.27 (3.205) | 202 (94.4) | 55 (12.8) | 76 (24.4) | ...... |
| 0.00 (0.00) | 2504 | 0.792 (2.998) | ...... | ...... | 168 (75.6) | 55 (12.5) | 75 (23.9) | ...... |
| 21.68 (16.17) | 2478 | 1.619 (6.129) | 0.515 (0.313) | 13.39 (2.638) | 173 (78.3) | 54 (12.2) | 74 (23.1) | ...... |
| 49.56 (36.96) | 2400 | 3.138 (11.879) | 0.436 (0.266) | 15.79 (3.111) | 204 (95.3) | 56 (13.1) | 76 (24.2) | ...... |
| 11.11 (8.28) | 2544 | 1.210 (4.580) | 0.751 (0.457) | 9.18 (1.808) | 169 (76.1) | 55 (12.8) | 75 (23.9) | ...... |
| 32.82 (24.47) | 2505 | 2.129 (8.059) | 0.447 (0.272) | 15.42 (3.036) | 179 (81.7) | 55 (12.8) | 75 (23.6) | ...... |
| Av 26.43 Av (19.71) | 2486 | 1.926 (7.291) | 0.502 (0.306) | 13.72 (2.703) | 182 (83.4) | 55 (12.7) | 75 (23.8) | 28.890 (97.827) |

### DRAWBAR PERFORMANCE
### (Front Wheel Dirve Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Maximum Available Power—Two Hours 5th Gear* | | | | | | | | | | | |
| 40.95 (30.53) | 3310 (14.72) | 4.64 (7.46) | 2400 | 7.72 | 2.991 (11.323) | 0.504 (0.306) | 13.69 (2.696) | 183 (83.9) | 48 (8.6) | 59 (15.0) | 29.065 (98.148) |
| *75% of Pull at Maximum Power—Ten Hours 5th Gear* | | | | | | | | | | | |
| 33.23 (24.78) | 2521 (11.21) | 4.94 (7.96) | 2510 | 5.94 | 2.496 (9.437) | 0.518 (0.315) | [illegible] | 166 (75.5) | 32 (-0.3) | 40 (4.2) | 29.411 (99.317) |
| *50% of Pull at Maximum Power—Two Hours 5th Gear* | | | | | | | | | | | |
| 22.88 (17.06) | 1689 (7.51) | 5.08 (8.18) | 2526 | 3.98 | 1.958 (7.412) | 0.590 (0.359) | 11.69 (2.302) | 167 (75.0) | 34 (1.1) | 40 (4.2) | 29.110 (98.300) |
| *50% of Pull at Reduced Engine Speed—Two Hours 6th Gear* | | | | | | | | | | | |
| 22.87 (17.06) | 1689 (7.51) | 5.08 (8.17) | 1679 | 4.01 | 1.632 (6.176) | 0.492 (0.299) | 14.02 (2.761) | 168 (75.3) | 42 (5.3) | 50 (9.7) | 29.095 (98.249) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 27.96 (20.85) | 5635 (25.06) | 1.86 (3.00) | 2499 | 14.90 | 2nd Gear | | | 169 (76.0) | 52 (11.1) | 63 (17.2) | 28.900 (97.591) |
| 38.87 (28.98) | 5536 (24.62) | 2.63 (4.24) | 2400 | 14.33 | 3rd Gear | | | 188 (86.7) | 52 (11.1) | 63 (17.2) | 28.910 (97.625) |
| 39.91 (29.76) | 4195 (18.65) | 3.57 (5.74) | 2400 | 10.14 | 4th Gear | | | 192 (88.9) | 52 (11.1) | 63 (17.2) | 28.910 (97.625) |
| 41.37 (30.85) | 3354 (14.92) | 4.63 (7.44) | 2398 | 7.92 | 5th Gear | | | 185 (85.0) | 50 (10.0) | 59 (15.0) | 28.870 (97.490) |
| 40.39 (30.12) | 2108 (9.38) | 7.18 (11.56) | 2398 | 4.82 | 6th Gear | | | 185 (85.0) | 52 (11.1) | 62 (16.7) | 28.820 (97.321) |

### LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2398 | 2161 | 1923 | 1689 | 1434 | 1195 |
|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 3354 (14.92) | 3506 (15.59) | 3590 (15.97) | 3674 (16.34) | 3702 (16.47) | 3532 (15.71) |
| Increase in Pull % | 0 | 5 | 7 | 10 | 10 | 5 |
| Power—Hp (kW) | 41.37 (30.85) | 38.72 (28.88) | 35.20 (26.25) | 31.55 (23.52) | 26.95 (20.09) | 21.52 (16.05) |
| Speed—Mph (km/h) | 4.63 (7.44) | 4.14 (6.67) | 3.68 (5.92) | 3.22 (5.18) | 2.73 (4.39) | 2.29 (3.68) |
| Slip % | 7.92 | 8.47 | 8.80 | 8.91 | 8.91 | 8.69 |

**Department of Agricultural Engineering**

**Dates of Test:** October 29 to November 14, 1981

**Manufacturer:** UNIVERSAL TRACTOR BRASOV (UTB) Brasov, Romania

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil** Long engine oil **SAE** 15W-40 **API service classification** SF-CD **To motor** 2.059 gal *(7.795 l)* **Drained from motor** 1.301 gal *(4.924 l)* **Transmission lubricant** Exxon torque fluid 56 or equiv. **Final drive lubricant** SAE 90 gearlube **Total time engine was operated** 60.5 hours

**ENGINE:** **Make** UTB diesel **Type** three cylinder vertical **Serial No.** D-115.050*005174* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.02" × 4.33" *(102 mm × 110 mm)* **Compression ratio** 17 to 1 **Displacement** 164.5 cu in *(2696 ml)* **Starting system** 12 volt **Lubrication pressure** **Air cleaner** oil bath with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** 414764 **Tread width** rear 52.3" *(1327 mm)* to 76.3" *(1937 mm)* front 59.5"*(1511 mm)* **Wheel base** 75.2" *(1910 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 33.9" *(860 mm)* Vertical distance above roadway 28.5" *(724 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.4 *(2.2)* second 2.1 *(3.4)* third 3.1 *(4.9)* fourth 4.0 *(6.4)* fifth 5.0 *(8.1)* sixth 7.5 *(12.1)* seventh 11.0 *(17.8)* eighth 14.3 *(22.9)* reverse 2.0 *(3.2)*, 7.2 *(11.6)* **Clutch** dual plate dry disc operated by foot pedal **Brakes** contracting band operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 161" *(4.09 m)* left 161" *(4.09 m)* (on concrete surface without brake) right 173" *(4.39 m)* left 173" *(4.39 m)* **Turning space diameter** (on concrete surface with brake applied) right 332" *(8.43 m)* left 332" *(8.43 m)* (on concrete surface without brake) right 356" *(9.04 m)* left 356" *(9.04 m)* **Power take-off** 540 rpm at 2160 engine rpm.

**REPAIRS and ADJUSTMENTS:** The fuel pump was replaced during preliminary PTO tests. The missing air baffles above radiator were installed during preliminary PTO test.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 171°F *(77.2°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. A end of the tests, the instrument cluster sup were found to be broken.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 98.5 | 98.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 97.0 |
| 50% of Pull at Maximum Power—Two Hours | | 95.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 92.0 |
| Bystander in 8th gear | | 86.5 |

### DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Maximum Available Power—Two Hours 5th Gear* | | | | | | | | | | | |
| 40.01 (29.84) | 3102 (13.80) | 4.84 (7.78) | 2399 | 6.58 | 3.064 (11.598) | 0.528 (0.321) | 13.06 (2.573) | 183 (83.9) | [illegible] | 58 (14.4) | 29.085 (98.216) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 33.32 (24.85) | 6657 (29.61) | 1.88 (3.02) | 2449 | 14.89 | 2nd Gear | | | 166 (74.4) | 35 (1.7) | 36 (2.2) | 29.230 (98.705) |
| 41.02 (30.59) | 3180 (14.14) | 4.84 (7.79) | 2400 | 6.64 | 5th Gear | | | 184 (84.4) | 48 (8.9) | 60 (15.6) | 29.070 (98.165) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 14.9-28; 6; 20 (140) | Two 14.9-28; 6; 20 (140) |
| Ballast | —Liquid (each) | 680 lb (308 kg) | None |
| | —Cast Iron (each) | 838 lb (380 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 9.5-20; 6; 35 (240) | Two 9.5-20; 6; 35 (240) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 400 lb (181 kg) | None |
| Height of Drawbar | | 18.5 in (470 mm) | 18.5 in (470 mm) |
| Static Weight with Operator—Rear | | 5990 lb (2717 kg) | 2955 lb (1340 kg) |
| —Front | | 3110 lb (1411 kg) | 2310 lb (1048 kg) |
| —Total | | 9100 lb (4128 kg) | 5265 lb (2388 kg) |

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1416.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**Long 510 DTC Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Roy G. Arnold, Director**

# NEBRASKA TRACTOR TEST 1417 — LONG 610 DIESEL
## 8 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—600 rpm)** | | | | | | | | |
| 64.33<br>*(47.97)* | 2400 | 4.192<br>*(15.868)* | 0.449<br>*(0.273)* | 15.34<br>*(3.023)* | 232<br>*(110.8)* | 62<br>*(16.6)* | 75<br>*(23.9)* | 28.810<br>*(97.287)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 60.57<br>*(45.17)* | 2160 | 3.803<br>*(14.396)* | 0.433<br>*(0.263)* | 15.93<br>*(3.138)* | 231<br>*(110.6)* | 61<br>*(16.3)* | 75<br>*(23.7)* | 28.815<br>*(97.304)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 56.84<br>*(42.39)* | 2492 | 3.546<br>*(13.423)* | 0.430<br>*(0.262)* | 16.03<br>*(3.158)* | 214<br>*(100.8)* | 62<br>*(16.4)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2566 | 1.075<br>*(4.069)* | .....<br>..... | .....<br>..... | 167<br>*(74.7)* | 62<br>*(16.4)* | 75<br>*(23.9)* | ......<br>...... |
| 28.75<br>*(21.44)* | 2524 | 2.158<br>*(8.169)* | 0.518<br>*(0.315)* | 13.32<br>*(2.625)* | 174<br>*(78.9)* | 61<br>*(16.1)* | 75<br>*(23.6)* | ......<br>...... |
| 65.50<br>*(48.84)* | 2400 | 4.290<br>*(16.239)* | 0.452<br>*(0.275)* | 15.27<br>*(3.008)* | 221<br>*(104.7)* | 61<br>*(16.1)* | 75<br>*(23.9)* | ......<br>...... |
| 14.50<br>*(10.81)* | 2545 | 1.566<br>*(5.928)* | 0.745<br>*(0.453)* | 9.26<br>*(1.824)* | 174<br>*(78.6)* | 61<br>*(16.1)* | 75<br>*(23.6)* | ......<br>...... |
| 42.80<br>*(31.92)* | 2504 | 2.850<br>*(10.788)* | 0.459<br>*(0.279)* | 15.02<br>*(2.959)* | 185<br>*(85.0)* | 61<br>*(16.1)* | 75<br>*(23.6)* | ......<br>...... |
| **Av** 34.73<br>**Av** *(25.90)* | 2505 | 2.581<br>*(9.770)* | 0.512<br>*(0.312)* | 13.46<br>*(2.651)* | 189<br>*(87.1)* | 61<br>*(16.2)* | 75<br>*(23.8)* | 28.820<br>*(97.331)* |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 56.12<br>*(41.85)* | 3922<br>*(17.45)* | 5.37<br>*(8.64)* | 2401 | 6.66 | 4.133<br>*(15.647)* | 0.506<br>*(0.308)* | 13.58<br>*(2.675)* | 193<br>*(89.2)* | 47<br>*(8.1)* | 53<br>*(11.7)* | 29.090<br>*(98.233)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 45.52<br>*(33.94)* | 3013<br>*(13.40)* | 5.67<br>*(9.12)* | 2455 | 4.90 | 3.368<br>*(12.751)* | 0.510<br>*(0.310)* | 13.51<br>*(2.662)* | 171<br>*(77.2)* | 42<br>*(5.6)* | 52<br>*(11.0)* | 29.135<br>*(98.385)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 31.33<br>*(23.36)* | 2023<br>*(9.00)* | 5.81<br>*(9.35)* | 2509 | 3.46 | 2.629<br>*(9.951)* | 0.579<br>*(0.352)* | 11.92<br>*(2.348)* | 169<br>*(75.8)* | 45<br>*(6.9)* | 55<br>*(12.5)* | 29.105<br>*(98.283)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 31.30<br>*(23.34)* | 2019<br>*(8.98)* | 5.81<br>*(9.36)* | 1668 | 3.43 | 2.175<br>*(8.233)* | 0.479<br>*(0.291)* | 14.39<br>*(2.835)* | 167<br>*(75.0)* | 43<br>*(6.1)* | 55<br>*(11.4)* | 29.110<br>*(98.300)* |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 39.90<br>*(29.75)* | 7018<br>*(31.22)* | 2.13<br>*(3.43)* | 2491 | 14.56 | 2nd Gear | 152<br>*(66.7)* | 38<br>*(3.3)* | 41<br>*(5.0)* | 28.930<br>*(97.692)* |
| 53.30<br>*(39.75)* | 6620<br>*(29.45)* | 3.02<br>*(4.86)* | 2401 | 14.28 | 3rd Gear | 180<br>*(81.9)* | 46<br>*(7.8)* | 50<br>*(10.0)* | 29.070<br>*(98.165)* |
| 55.90<br>*(41.73)* | 5065<br>*(22.53)* | 4.15<br>*(6.67)* | 2401 | 8.90 | 4th Gear | 186<br>*(85.6)* | 46<br>*(7.8)* | 49<br>*(9.4)* | 29.060<br>*(98.131)* |
| 57.48<br>*(42.86)* | 4015<br>*(17.86)* | 5.37<br>*(8.64)* | 2397 | 6.45 | 5th Gear | 187<br>*(85.8)* | 45<br>*(7.2)* | 47<br>*(8.3)* | 29.040<br>*(98.064)* |
| 56.32<br>*(42.00)* | 2549<br>*(11.34)* | 8.29<br>*(13.34)* | 2399 | 4.19 | 6th Gear | 187<br>*(85.8)* | 47<br>*(8.3)* | 51<br>*(10.6)* | 29.080<br>*(98.199)* |

### LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2397 | 2163 | 1917 | 1686 | 1438 | 1196 | 955 |
|---|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 4015<br>*(17.86)* | 4161<br>*(18.51)* | 4317<br>*(19.20)* | 4468<br>*(19.87)* | 4594<br>*(20.44)* | 4672<br>*(20.78)* | 4495<br>*(19.99)* |
| Increase in Pull % | 0 | 4 | 8 | 11 | 14 | 16 | 12 |
| Power—Hp *(kW)* | 57.48<br>*(42.86)* | 53.57<br>*(39.95)* | 49.04<br>*(36.57)* | 44.49<br>*(33.18)* | 38.93<br>*(29.03)* | 32.83<br>*(24.48)* | 25.32<br>*(18.88)* |
| Speed—Mph *(km/h)* | 5.37<br>*(8.64)* | 4.83<br>*(7.77)* | 4.26<br>*(6.86)* | 3.73<br>*(6.01)* | 3.18<br>*(5.11)* | 2.64<br>*(4.24)* | 2.11<br>*(3.40)* |
| Slip % | 6.45 | 6.99 | 7.54 | 7.57 | 7.81 | 8.15 | 7.81 |

**Department of Agricultural Engineering**

**Dates of Test:** October 27 to November 10, 1981

**Manufacturer:** UNIVERSAL TRACTOR BRASOV (UTB) Brasov, Romania

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8281 **Fuel weight** 6.895 lbs/gal *(0.826 kg/l)* **Oil** Long engine oil **SAE** 15W-40 **API service classification** SF-CD **To motor** 5.558 gal *(12.710 l)* **Drained from motor** 2.120 gal *(8.024 l)* **Transmission lubricant** Exxon torque fluid 56 or equiv. **Final drive lubricant** SAE 90 gearlube **Total time engine was operated** 40.0 hours

**ENGINE:** **Make** UTB diesel **Type** four cylinder vertical **Serial No.** D-121.050*004844* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.02" × 4.33" *(102 mm × 110 mm)* **Compression ratio** 17 to 1 **Displacement** 219 cu in *(3595 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** oil bath with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** 660679 **Tread width** rear 56.3" *(1430 mm)* to 79" *(2007 mm)* front 52" *(1320 mm)* to 79" *(2007 mm)* **Wheel base** 81.5" *(2070 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.8" *(783 mm)* Vertical distance above roadway 29.8" *(756 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.6 *(2.5)* second 2.3 *(3.8)* third 3.4 *(5.5)* fourth 4.4 *(7.1)* fifth 5.6 *(9.0)* sixth 8.4 *(13.5)* seventh 12.3 *(19.8)* eighth 15.9 *(25.6)* reverse 2.2 *(3.6)*, 8.0 *(12.9)* **Clutch** dual plate dry disc operated by foot pedal **Brakes** contracting band operated by two foot pedals which can be locked together and hand lever **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 119" *(3.02 m)* left 119" *(3.02 m)* (on concrete surface without brake) right 131" *(3.33 m)* left 131" *(3.33 m)* **Turning space diameter** (on concrete surface with brake applied) right 248" *(6.3 m)* left 248" *(6.3 m)* (on concrete surface without brake) right 272" *(6.91 m)* left 272" *(6.91 m)* **Power take-off** 540 rpm at 2160 engine rpm.

**REPAIRS and ADJUSTMENTS:** The fuel filters were replaced during preliminary PTO tests.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 171°F *(77.3°C)*. Five gears were chosen between tire tangential pull limit and 10 mph *(16.1 km/h)*. Oil leaked from the crankshaft rear main oil seal during test. During final inspection, number three cylinder was found to be scratched.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1417.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.5 |
| 75% of Pull at Maximum Power—Ten Hours | 96.5 |
| 50% of Pull at Maximum Power—Two Hours | 96.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 92.5 |
| Bystander in 8th gear | 86.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 16.9-28; 6; 18 *(125)* | Two 16.9-28; 6; 18 *(125)* |
| Ballast | —Liquid (each) | 895 lb *(406 kg)* | None |
| | —Cast Iron (each) | 838 lb *(380 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-16SL; 6; 32 *(220)* | Two 7.50-16SL; 6; 32 *(220)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 415 lb *(187 kg)* | None |
| Height of Drawbar | | 21 in *(535 mm)* | 21 in *(535 mm)* |
| Static Weight with Operator | —Rear | 6430 lb *(2917 kg)* | 2965 lb *(1345 kg)* |
| | —Front | 2555 lb *(1159 kg)* | 1730 lb *(785 kg)* |
| | —Total | 8985 lb *(4076 kg)* | 4695 lb *(2130 kg)* |

**Long 610 Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Roy G. Arnold, Director

# NEBRASKA TRACTOR TEST 1419 — INTERNATIONAL 5088 DIESEL 18 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1005 rpm)** | | | | | | | | |
| 136.12<br>*(101.50)* | 2400 | 8.888<br>*(33.645)* | 0.450<br>*(0.274)* | 15.32<br>*(3.017)* | 185<br>*(85.0)* | 53<br>*(11.7)* | 75<br>*(23.9)* | 28.943<br>*(97.737)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 121.46<br>*(90.57)* | 2518 | 8.468<br>*(32.055)* | 0.480<br>*(0.292)* | 14.34<br>*(2.825)* | 184<br>*(84.4)* | 53<br>*(11.7)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2671 | 3.278<br>*(12.409)* | .....<br>..... | .....<br>..... | 182<br>*(83.3)* | 53<br>*(11.7)* | 75<br>*(23.9)* | ......<br>...... |
| 62.66<br>*(46.73)* | 2598 | 5.842<br>*(22.114)* | 0.643<br>*(0.391)* | 10.73<br>*(2.113)* | 183<br>*(83.9)* | 53<br>*(11.7)* | 76<br>*(24.2)* | ......<br>...... |
| 136.27<br>*(101.62)* | 2400 | 8.890<br>*(33.652)* | 0.450<br>*(0.274)* | 15.33<br>*(3.020)* | 186<br>*(85.6)* | 52<br>*(11.1)* | 75<br>*(23.9)* | ......<br>...... |
| 31.85<br>*(23.75)* | 2640 | 4.606<br>*(17.436)* | 0.997<br>*(0.606)* | 6.91<br>*(1.362)* | 182<br>*(83.3)* | 52<br>*(10.8)* | 74<br>*(23.3)* | ......<br>...... |
| 92.61<br>*(69.06)* | 2560 | 7.105<br>*(26.895)* | 0.529<br>*(0.322)* | 13.03<br>*(2.568)* | 184<br>*(84.4)* | 53<br>*(11.4)* | 76<br>*(24.2)* | ......<br>...... |
| Av 74.14<br>*Av (55.29)* | 2564 | 6.365<br>*(24.094)* | 0.592<br>*(0.360)* | 11.65<br>*(2.295)* | 184<br>*(84.2)* | 53<br>*(11.4)* | 75<br>*(23.9)* | 28.910<br>*(97.625)* |

## DRAWBAR PERFORMANCE WITH RADIAL PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 116.19<br>*(86.63)* | 8611<br>*(38.31)* | 5.06<br>*(8.14)* | 2400 | 3.19 | 8.780<br>*(33.234)* | 0.521<br>*(0.317)* | 13.23<br>*(2.607)* | 180<br>*(82.2)* | 54<br>*(11.9)* | 68<br>*(20.0)* | 28.805<br>*(97.270)* |
| **75% of Pull at Maximum Power—Ten Hours 9th (M3) Gear** | | | | | | | | | | | |
| 97.36<br>*(72.60)* | 6748<br>*(30.02)* | 5.41<br>*(8.71)* | 2547 | 2.66 | 8.083<br>*(30.598)* | 0.572<br>*(0.348)* | 12.04<br>*(2.373)* | 176<br>*(80.1)* | 40<br>*(4.3)* | 44<br>*(6.4)* | 28.887<br>*(97.547)* |
| **50% of Pull at Maximum Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 66.78<br>*(49.80)* | 4510<br>*(20.06)* | 5.55<br>*(8.94)* | 2594 | 1.95 | 6.748<br>*(25.544)* | 0.696<br>*(0.424)* | 9.90<br>*(1.949)* | 178<br>*(80.8)* | 36<br>*(2.2)* | 38<br>*(3.3)* | 28.595<br>*(96.560)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (H1) Gear** | | | | | | | | | | | |
| 66.87<br>*(49.87)* | 4517<br>*(20.09)* | 5.55<br>*(8.94)* | 1559 | 1.95 | 4.861<br>*(18.402)* | 0.501<br>*(0.305)* | 13.76<br>*(2.710)* | 178<br>*(80.8)* | 37<br>*(2.8)* | 39<br>*(3.9)* | 28.610<br>*(96.612)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 99.26<br>*(74.02)* | 14960<br>*(66.55)* | 2.49<br>*(4.00)* | 2510 | 14.30 | 5th (L5) Gear | | | 178<br>*(81.1)* | 45<br>*(7.2)* | 55<br>*(12.8)* | 28.730<br>*(97.017)* |
| 114.17<br>*(85.14)* | 14357<br>*(63.86)* | 2.98<br>*(4.80)* | 2398 | 8.56 | 6th (L6) Gear | | | 178<br>*(81.1)* | 45<br>*(7.2)* | 54<br>*(12.2)* | 28.760<br>*(97.118)* |
| 119.92<br>*(89.42)* | 12217<br>*(54.34)* | 3.68<br>*(5.92)* | 2399 | 5.23 | 7th (M1) Gear | | | 180<br>*(81.9)* | 51<br>*(10.6)* | 62<br>*(16.7)* | 28.860<br>*(97.456)* |
| 120.49<br>*(89.85)* | 10310<br>*(45.86)* | 4.38<br>*(7.05)* | 2399 | 4.05 | 8th (M2) Gear | | | 180<br>*(81.9)* | 50<br>*(10.0)* | 60<br>*(15.6)* | 28.870<br>*(97.490)* |
| 121.17<br>*(90.36)* | 8986<br>*(39.97)* | 5.06<br>*(8.14)* | 2399 | 3.32 | 9th (M3) Gear | | | 180<br>*(81.9)* | 52<br>*(11.1)* | 64<br>*(17.8)* | 28.840<br>*(97.388)* |
| 120.36<br>*(89.90)* | 7559<br>*(33.63)* | 5.98<br>*(9.62)* | 2398 | 2.74 | 10th (M4) Gear | | | 180<br>*(82.2)* | 52<br>*(11.1)* | 63<br>*(17.2)* | 28.850<br>*(97.422)* |
| 119.01<br>*(88.75)* | 6402<br>*(28.48)* | 6.97<br>*(11.22)* | 2399 | 2.41 | 11th (M5) Gear | | | 179<br>*(81.7)* | 46<br>*(7.8)* | 54<br>*(12.2)* | 28.880<br>*(97.523)* |
| 117.22<br>*(87.41)* | 5340<br>*(23.75)* | 8.23<br>*(13.25)* | 2400 | 1.91 | 12th (M6) Gear | | | 179<br>*(81.7)* | 48<br>*(8.9)* | 57<br>*(13.9)* | 28.880<br>*(97.523)* |

### LUGGING ABILITY IN 9th (M3) GEAR

| Crankshaft Speed rpm | 2399 | 2159 | 1924 | 1677 | 1432 | 1196 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 8986<br>*(39.97)* | 10381<br>*(46.18)* | 11373<br>*(50.59)* | 11589<br>*(51.55)* | 10894<br>*(48.46)* | 10201<br>*(45.38)* |
| Increase in Pull % | 0 | 16 | 27 | 29 | 21 | 14 |
| Power—Hp<br>*(kW)* | 121.17<br>*(90.36)* | 125.10<br>*(93.28)* | 121.42<br>*(90.54)* | 107.61<br>*(80.25)* | 86.79<br>*(64.72)* | 68.12<br>*(50.79)* |
| Speed—Mph<br>*(km/h)* | 5.06<br>*(8.14)* | 4.52<br>*(7.27)* | 4.00<br>*(6.44)* | 3.48<br>*(5.60)* | 2.99<br>*(4.81)* | 2.50<br>*(4.03)* |
| Slip % | 3.32 | 3.97 | 4.45 | 4.76 | 4.29 | 3.97 |

**Department of Agricultural Engineering**

**Dates of Test:** November 12-December 8, 1981

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8276 **Fuel weight** 6.891 lbs/gal *(0.826 kg/l)* **Oil SAE 30 API service classification** CD/SE **To motor** 4.127 gal *(15.622 l)* **Drained from motor** 3.775 gal *(14.291 l)* **Transmission and final drive lubricant** IH Hytran fluid **Total time engine was operated** 73.5 hours.

**ENGINE: Make** International Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 437TT2U128248* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.30" × 5.00" *(109.2 mm × 127.0 mm)* **Compression ratio** 15.4 to 1 **Displacement** 436 cu in *(7145 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard with duals **Serial No.** 2540002U000872* **Tread width** rear 62" *(1575 mm)* to 124" *(3150 mm)* front 60" *(1524 mm)* to 84" *(2134 mm)* **Wheel base** 111.6" *(2835 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.8" *(706 mm)* Vertical distance above roadway 39.0" *(991 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 1.4 *(2.3)* second 1.7 *(2.7)* third 1.9 *(3.1)* fourth 2.3 *(3.6)* fifth 2.6 *(4.2)* sixth 3.1 *(5.0)* seventh 3.7 *(5.9)* eighth 4.3 *(7.0)* ninth 5.0 *(8.0)* tenth 5.8 *(9.4)* eleventh 6.8 *(10.9)* twelfth 7.9 *(12.8)* thirteenth 8.2 *(13.3)* fourteenth 9.7 *(15.6)* fifteenth 11.1 *(17.9)* sixteenth 13.1 *(21.0)* seventeenth 15.2 *(24.4)* eighteenth 17.8 *(28.7)* reverse 2.8 *(4.4)*, 3.2 *(5.2)*, 3.7 *(6.0)*, 4.4 *(7.0)*, 5.1 *(8.1)*, 6.0 *(9.6)* **Clutch** multiple wet disc operated by foot pedal with hydraulic power assist **Brakes** multiple wet disc hydraulically power activated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 145.5" *(3.70 m)* left 145.5" *(3.70 m)* (on concrete surface without brake) right 188" *(4.78 m)* left 188" *(4.78 m)* **Turning space diameter** (on concrete surface with brake applied) right 302" *(7.68 m)* left 302" *(7.68 m)* (on concrete surface without brake) right 387.1" *(9.83 m)* left 387.1" *(9.83 m)* **Power take-off** 1005 rpm at 2400 engine rpm and 540 rpm at 2428 engine rpm.

| TRACTOR SOUND LEVEL WITH CAB | Bias dB(A) | Radials dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 78.5 | 78.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 78.5 |
| 50% of Pull at Maximum Power—Two Hours | | 78.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 74.5 |
| Bystander in 18th (H6) gear | | 85.0 |

## DRAWBAR PERFORMANCE WITH BIAS PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 114.14<br>*(85.11)* | 9214<br>*(40.99)* | 4.65<br>*(7.48)* | 2399 | 6.76 | 8.925<br>*(33.784)* | 0.539<br>*(0.328)* | 12.79<br>*(2.519)* | 178<br>*(81.1)* | 49<br>*(9.2)* | 57<br>*(13.9)* | 28.885<br>*(97.540)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 100.42<br>*(74.88)* | 13571<br>*(60.37)* | 2.77<br>*(4.47)* | 2509 | 14.50 | 6th (L6) Gear | | | 177<br>*(80.6)* | 40<br>*(4.4)* | 52<br>*(11.1)* | 28.820<br>*(97.320)* |
| 110.88<br>*(82.68)* | 12969<br>*(57.69)* | 3.21<br>*(5.16)* | 2399 | 13.36 | 7th (M1) Gear | | | 179<br>*(81.7)* | 36<br>*(2.2)* | 42<br>*(5.6)* | 29.010<br>*(97.962)* |
| 116.41<br>*(86.80)* | 10993<br>*(48.90)* | 3.97<br>*(6.39)* | 2399 | 8.56 | 8th (M2) Gear | | | 178<br>*(81.1)* | 37<br>*(2.8)* | 43<br>*(6.1)* | 28.990<br>*(97.895)* |
| 118.46<br>*(88.34)* | 9573<br>*(42.58)* | 4.64<br>*(7.47)* | 2397 | 6.79 | 9th (M3) Gear | | | 178<br>*(81.1)* | 39<br>*(3.9)* | 44<br>*(6.7)* | 28.930<br>*(97.692)* |
| 118.17<br>*(88.12)* | 7996<br>*(35.57)* | 5.54<br>*(8.92)* | 2400 | 5.40 | 10th (M4) Gear | | | 177<br>*(80.6)* | 38<br>*(3.3)* | 45<br>*(7.2)* | 28.950<br>*(97.760)* |
| 115.84<br>*(86.38)* | 6695<br>*(29.78)* | 6.49<br>*(10.44)* | 2398 | 4.43 | 11th (M5) Gear | | | 176<br>*(79.7)* | 39<br>*(3.9)* | 45<br>*(7.2)* | 28.950<br>*(97.760)* |
| 114.88<br>*(85.66)* | 5600<br>*(24.91)* | 7.69<br>*(12.38)* | 2399 | 3.58 | 12th (M6) Gear | | | 178<br>*(81.1)* | 39<br>*(3.9)* | 45<br>*(7.2)* | 28.940<br>*(97.726)* |
| 115.45<br>*(86.09)* | 5408<br>*(24.06)* | 8.00<br>*(12.88)* | 2399 | 3.51 | 13th (H1) Gear | | | 175<br>*(79.4)* | 39<br>*(3.9)* | 44<br>*(6.7)* | 28.940<br>*(97.726)* |

### LUGGING ABILITY IN 9th (M3) GEAR

| Crankshaft Speed rpm | 2397 | 2161 | 1921 | 1688 | 1437 | 1205 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 9573<br>*(42.58)* | 10962<br>*(48.76)* | 12190<br>*(54.22)* | 12563<br>*(55.88)* | 11823<br>*(52.59)* | 11088<br>*(49.32)* |
| Increase in Pull % | 0 | 15 | 27 | 31 | 24 | 16 |
| Power—Hp<br>*(kW)* | 118.46<br>*(88.34)* | 120.01<br>*(89.49)* | 116.26<br>*(86.70)* | 103.02<br>*(76.83)* | 84.26<br>*(62.83)* | 67.51<br>*(50.34)* |
| Speed—Mph<br>*(km/h)* | 4.64<br>*(7.47)* | 4.11<br>*(6.61)* | 3.58<br>[illegible] | 3.08<br>*(4.95)* | 2.67<br>*(4.30)* | 2.28<br>*(3.67)* |
| Slip % | 6.79 | 8.49 | [illegible] | 12.25 | 10.40 | 8.77 |

| TIRES, BALLAST AND WEIGHT | | Radial Ply Tires With Ballast | Radial Ply Tires Without Ballast | Bias Ply Tires With Ballast | Bias Ply Tires Without Ballast |
|---|---|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Inner two 18.4R38; 8; 12 *(85)*<br>Outer two 18.4R38; 6; 12 *(85)* | Inner two 18.4R38; 8; 12 *(85)*<br>Outer two 18.4R38; 6; 12 *(85)* | Inner two 18.4-38; 8; 12 *(85)*<br>Outer two 18.4-38; 6; 12 *(85)* | Inner two 18.4-38; 8; 12 *(85)*<br>Outer two 18.4-38; 6; 12 *(85)* |
| Ballast | —Liquid (each inner) | None | None | 355 lb *(161 kg)* | None |
| | —Test equip. (each) | 40 lb *(18 kg)* | None | 40 lb *(18 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 10.00-16; 6; 32 *(220)* | Two 10.00-16; 6; 32 *(220)* | Two 10.00-16; 6; 32 *(220)* | Two 10.00-16; 6; 32 *(220)* |
| Ballast | —Liquid (each) | None | None | None | None |
| | —Test equip. (each) | 40 lb *(18 kg)* | None | 40 lb *(18 kg)* | None |
| Height of Drawbar | | 20.5 lb *(520 mm)* | 20.5 in *(520 mm)* | 19.5 in *(495 mm)* | 19.5 in *(495 mm)* |
| Static Weight with Operator—Rear | | 12200 lb *(5534 kg)* | 12040 lb *(5461 kg)* | 12490 lb *(5665 kg)* | 11620 lb *(5271 kg)* |
| —Front | | 4050 lb *(1837 kg)* | 3970 lb *(1801 kg)* | 4050 lb *(1837 kg)* | 3970 lb *(1801 kg)* |
| —Total | | 16250 lb *(7371 kg)* | 16010 lb *(7262 kg)* | 16540 lb *(7502 kg)* | 15590 lb *(7072 kg)* |

**REPAIRS and ADJUSTMENTS:** The thermostat malfunctioned at the start of the 50% load drawbar test. It was removed, checked and reinstalled and the test rerun.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.8°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1419.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**International 5088 Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Roy G. Arnold, Director**

# NEBRASKA TRACTOR TEST 1420 — INTERNATIONAL 5288 DIESEL 18 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1005 rpm)** | | | | | | | | |
| 162.60<br>*(121.25)* | 2400 | 10.120<br>*(38.308)* | 0.429<br>*(0.261)* | 16.07<br>*(3.165)* | 188<br>*(86.4)* | 50<br>*(10.2)* | 75<br>*(23.8)* | 29.177<br>*(98.525)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 141.13<br>*(105.24)* | 2451 | 9.173<br>*(34.724)* | 0.448<br>*(0.272)* | 15.39<br>*(3.031)* | 187<br>*(85.8)* | 51<br>*(10.3)* | 74<br>*(23.3)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2646 | 3.339<br>*(12.639)* | .....<br>..... | .....<br>..... | 182<br>*(83.3)* | 51<br>*(10.3)* | 75<br>*(23.6)* | ......<br>...... |
| 73.66<br>*(54.93)* | 2557 | 6.278<br>*(23.765)* | 0.587<br>*(0.357)* | 11.73<br>*(2.311)* | 184<br>*(84.4)* | 51<br>*(10.6)* | 76<br>*(24.2)* | ......<br>...... |
| 162.12<br>*(120.89)* | 2400 | 10.109<br>*(38.267)* | 0.430<br>*(0.261)* | 16.04<br>*(3.159)* | 189<br>*(86.9)* | 51<br>*(10.6)* | 76<br>*(24.2)* | ......<br>...... |
| 37.41<br>*(27.90)* | 2606 | 4.802<br>*(18.178)* | 0.885<br>*(0.538)* | 7.79<br>*(1.535)* | 182<br>*(83.3)* | 51<br>*(10.6)* | 75<br>*(23.9)* | ......<br>...... |
| 108.20<br>*(80.68)* | 2508 | 7.719<br>*(29.220)* | 0.492<br>*(0.299)* | 14.02<br>*(2.761)* | 184<br>*(84.2)* | 51<br>*(10.6)* | 75<br>*(23.6)* | ......<br>...... |
| **Av 87.09**<br>*Av (64.94)* | **2528** | **6.903**<br>*(26.131)* | **0.546**<br>*(0.332)* | **12.62**<br>*(2.485)* | **184**<br>*(84.7)* | **51**<br>*(10.4)* | **75**<br>*(23.8)* | **29.107**<br>*(98.289)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 157.63<br>*(102.63)* | 9801<br>*(43.60)* | 5.27<br>*(8.47)* | 2399 | 3.07 | 10.049<br>*(38.041)* | 0.505<br>*(0.306)* | 13.70<br>*(2.698)* | 180<br>*(82.2)* | 46<br>*(7.8)* | 51<br>*(10.5)* | 28.495<br>*(96.223)* |
| **75% of Pull at Maximum Power—Ten Hours 9th (M3) Gear** | | | | | | | | | | | |
| 111.43<br>*(83.09)* | 7605<br>*(33.83)* | 5.49<br>*(8.84)* | 2485 | 2.30 | 8.729<br>*(33.042)* | 0.540<br>*(0.328)* | 12.77<br>*(2.515)* | 178<br>*(81.2)* | 33<br>*(0.3)* | 36<br>*(2.3)* | 28.973<br>*(97.837)* |
| **50% of Pull at Maximum Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 76.85<br>*(57.31)* | 5092<br>*(22.65)* | 5.66<br>*(9.11)* | 2541 | 1.56 | 7.147<br>*(27.054)* | 0.641<br>*(0.390)* | 10.75<br>*(2.118)* | 176<br>*(79.7)* | 42<br>*(5.6)* | 46<br>*(7.8)* | 28.770<br>*(97.152)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (H1) Gear** | | | | | | | | | | | |
| 76.64<br>*(57.15)* | 5083<br>*(22.61)* | 5.65<br>*(9.10)* | 1524 | 1.51 | 5.333<br>*(20.188)* | 0.480<br>*(0.292)* | 14.37<br>*(2.831)* | 176<br>*(80.0)* | 46<br>*(9.3)* | 53<br>*(11.7)* | 28.760<br>*(97.118)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 117.48<br>*(87.60)* | 17577<br>*(78.19)* | 2.51<br>*(4.03)* | 2431 | 14.27 | 5th (L5) Gear | | | 181<br>*(82.5)* | 56<br>*(13.3)* | 65<br>*(18.3)* | 28.410<br>*(95.936)* |
| 136.62<br>*(101.88)* | 16175<br>*(71.95)* | 3.17<br>*(5.10)* | 2400 | 6.59 | 6th (L6) Gear | | | 181<br>*(82.5)* | 56<br>*(13.3)* | 65<br>*(18.3)* | 28.400<br>*(95.903)* |
| 141.22<br>*(105.31)* | 13775<br>*(61.28)* | 3.84<br>*(6.19)* | 2399 | 4.57 | 7th (M1) Gear | | | 181<br>*(82.5)* | 56<br>*(13.3)* | 65<br>*(18.3)* | 28.400<br>*(95.903)* |
| 141.14<br>*(105.25)* | 11589<br>*(51.55)* | 4.57<br>*(7.35)* | 2398 | 3.57 | 8th (M2) Gear | | | 181<br>*(82.8)* | 56<br>*(13.3)* | 63<br>*(17.2)* | 28.390<br>*(95.869)* |
| 142.37<br>*(106.16)* | 10133<br>*(45.08)* | 5.27<br>*(8.48)* | 2399 | 2.90 | 9th (M3) Gear | | | 181<br>*(82.8)* | 55<br>*(12.8)* | 60<br>*(15.6)* | 28.380<br>*(95.835)* |
| 140.74<br>*(104.95)* | 8494<br>*(37.78)* | 6.21<br>*(10.00)* | 2398 | 2.64 | 10th (M4) Gear | | | 181<br>*(82.8)* | 56<br>*(13.3)* | 65<br>*(18.3)* | 28.400<br>*(95.903)* |
| 139.32<br>*(103.89)* | 7201<br>*(32.03)* | 7.26<br>*(11.68)* | 2399 | 2.12 | 11th (M5) Gear | | | 182<br>*(83.3)* | 55<br>*(12.8)* | 64<br>*(17.8)* | 28.410<br>*(95.936)* |
| 136.23<br>*(101.59)* | 5988<br>*(26.35)* | 8.56<br>*(13.78)* | 2400 | 1.77 | 12th (M6) Gear | | | 181<br>*(82.5)* | 55<br>*(12.8)* | 64<br>*(17.8)* | 28.410<br>*(95.936)* |

## LUGGING ABILITY IN 9th (M3) GEAR

| Crankshaft Speed rpm | 2399 | 2158 | 1919 | 1675 | 1426 | 1201 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 10133<br>*(45.08)* | 11420<br>*(50.80)* | 12410<br>*(55.20)* | 12936<br>*(57.54)* | 12297<br>*(54.70)* | 11250<br>*(50.04)* |
| Increase in Pull % | 0 | 13 | 22 | 28 | 21 | 11 |
| Power—Hp *(kW)* | 142.37<br>*(106.16)* | 143.57<br>*(107.06)* | 138.20<br>*(103.06)* | 125.32<br>*(93.45)* | 101.66<br>*(75.81)* | 78.69<br>*(58.68)* |
| Speed—Mph *(km/h)* | 5.27<br>*(8.48)* | 4.71<br>*(7.59)* | 4.18<br>*(6.72)* | 3.63<br>*(5.85)* | 3.10<br>*(4.99)* | 2.62<br>*(4.22)* |
| Slip % | 2.90 | 3.41 | 3.91 | 4.24 | 3.91 | 3.41 |

**Department of Agricultural Engineering**

**Dates of Test:** November 13-24, 1981

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.3 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8276 **Fuel weight** 6.891 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** CD/SE **To motor** 4.156 gal *(15.731 l)* **Drained from motor** 3.547 gal *(13.428 l)* **Transmission and final drive lubricant** I.H. Hytran fluid **Total time engine was operated** 40.5 hours

**ENGINE: Make** International Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 467TT2U160101* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.30" × 5.35" *(109.2 mm × 135.9 mm)* **Compression ratio** 15.4 to 1 **Displacement** 466 cu in *(7636 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard with duals **Serial No.** 2580002U000942* **Tread width** rear 64" *(1625 mm)* to 128" *(3250 mm)* front 62.5" *(1588 mm)* to 86.5" *(2197 mm)* **Wheel base** 111.6" *(2835 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.3" *(693 mm)* Vertical distance above roadway 38.9" *(988 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 1.5 *(2.4)* second 1.7 *(2.8)* third 2.0 *(3.2)* fourth 2.3 *(3.8)* fifth 2.7 *(4.4)* sixth 3.2 *(5.2)* seventh 3.8 *(6.1)* eighth 4.5 *(7.2)* ninth 5.1 *(8.3)* tenth 6.0 *(9.7)* eleventh 7.0 *(11.3)* twelfth 8.2 *(13.3)* thirteenth 8.5 *(13.7)* fourteenth 10.0 *(16.1)* fifteenth 11.5 *(18.6)* sixteenth 13.5 *(21.7)* seventeenth 15.6 *(25.2)* eighteenth 18.4 *(29.6)* reverse 2.9 *(4.6)*, 3.3 *(5.4)*, 3.8 *(6.2)*, 4.5 *(7.3)*, 5.2 *(8.4)*, 6.1 *(9.9)* **Clutch** multiple wet disc operated by foot pedal with hydraulic power assist **Brakes** multiple wet disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 151.1" *(3.84 m)* left 151.1" *(3.84 m)* (on concrete surface without brake) right 199.5" *(5.07 m)* left 199.5" *(5.07 m)* **Turning space diameter** (on concrete surface with brake applied) right 316" *(8.03 m)* left 316" *(8.03 m)* (on concrete surface without brake) right 412.8" *(10.49 m)* left 412.8" *(10.49 m)* **Power take-off** 1005 rpm at 2400 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

| **TRACTOR SOUND LEVEL WITH CAB** | **dB(A)** |
|---|---|
| Maximum Available Power—Two Hours | 77.0 |
| 75% of Pull at Maximum Power—Ten Hours | 77.5 |
| 50% of Pull at Maximum Power—Two Hours | 77.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 73.5 |
| Bystander in 18th (H6) gear | 86.0 |

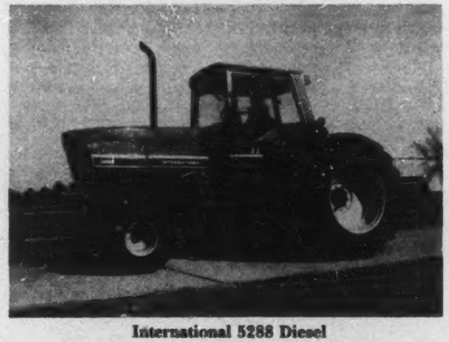
| **TIRES, BALLAST AND WEIGHT** | | **With Ballast** | **Without Ballast** |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Inner two 20.8R38; 10; 12 *(85)*<br>Outer two 20.8R38; 8; 12 *(85)* | Inner two 20.8R38; 10; 12 *(85)*<br>Outer two 20.8R38; 8; 12 *(85)* |
| **Ballast** | —Liquid (each inner) | 760 lb *(345 kg)* | None |
| | —Cast Iron (each) | None | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 14L-16.1; 6; 28 *(195)* | Two 14L-16.1; 6; 28 *(195)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Test equip. (each) | 5 lb *(2 kg)* | None |
| **Height of Drawbar** | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| **Static Weight with Operator** | —Rear | 14425 lb *(6543 kg)* | 12905 lb *(5854 kg)* |
| | —Front | 4160 lb *(1887 kg)* | 4150 lb *(1882 kg)* |
| | —Total | 18585 lb *(8430 kg)* | 17055 lb *(7736 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 128°F *(53.3°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1420**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



**International 5288 Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Roy G. Arnold, Director**

# NEBRASKA TRACTOR TEST 1421 — FORD 2610 (8 X 2) DIESEL
# 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—597 rpm)** | | | | | | | | |
| 36.09<br>*(27.36)* | 2000 | 2.338<br>*(8.850)* | 0.439<br>*(0.267)* | 15.60<br>*(3.092)* | 198<br>*(92.4)* | 52<br>*(11.2)* | 75<br>*(24.0)* | 28.970<br>*(97.827)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 35.14<br>*(26.20)* | 1809 | 2.176<br>*(8.237)* | 0.427<br>*(0.260)* | 16.15<br>*(3.181)* | 201<br>*(94.1)* | 53<br>*(11.7)* | 75<br>*(23.9)* | 28.950<br>*(97.760)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 32.20<br>*(24.01)* | 2066 | 2.084<br>*(7.889)* | 0.446<br>*(0.272)* | 15.45<br>*(3.043)* | 188<br>*(86.4)* | 54<br>*(12.2)* | 75<br>*(23.9)* | ……<br>…… |
| 0.00<br>*(0.00)* | 2120 | 0.722<br>*(2.733)* | .....<br>..... | .....<br>..... | 166<br>*(74.4)* | 54<br>*(12.5)* | 75<br>*(23.9)* | ……<br>…… |
| 16.33<br>*(12.18)* | 2095 | 1.348<br>*(5.103)* | 0.569<br>*(0.346)* | 12.11<br>*(2.387)* | 172<br>*(77.5)* | 54<br>*(12.5)* | 75<br>*(23.9)* | ……<br>…… |
| 37.31<br>*(27.82)* | 2002 | 2.358<br>*(8.926)* | 0.436<br>*(0.265)* | 15.83<br>*(3.117)* | 193<br>*(89.4)* | 55<br>*(12.8)* | 76<br>*(24.2)* | ……<br>…… |
| 8.21<br>*(6.12)* | 2106 | 1.015<br>*(3.835)* | 0.851<br>*(0.518)* | 8.10<br>*(1.596)* | 168<br>*(75.8)* | 55<br>*(12.8)* | 76<br>*(24.2)* | ……<br>…… |
| 24.34<br>*(18.15)* | 2080 | 1.709<br>*(6.469)* | 0.484<br>*(0.295)* | 14.24<br>*(2.806)* | 174<br>*(79.2)* | 55<br>*(12.8)* | 74<br>*(23.6)* | ……<br>…… |
| Av 19.73<br>*Av (14.71)* | 2078 | 1.539<br>*(5.826)* | 0.538<br>*(0.327)* | 12.82<br>*(2.525)* | 177<br>*(80.4)* | 55<br>*(12.6)* | 75<br>*(23.8)* | 28.950<br>*(97.760)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 30.47<br>*(22.72)* | 2070<br>*(9.21)* | 5.52<br>*(8.89)* | 1999 | 5.34 | 2.338<br>*(8.850)* | 0.529<br>*(0.322)* | 13.03<br>*(2.567)* | 198<br>*(91.9)* | 60<br>*(15.6)* | 76<br>*(24.4)* | 28.385<br>*(95.852)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 25.01<br>*(18.65)* | 1631<br>*(7.26)* | 5.75<br>*(9.25)* | 2074 | 4.89 | 1.968<br>*(7.451)* | 0.543<br>*(0.330)* | 12.71<br>*(2.503)* | 169<br>*(75.9)* | 30<br>*(−0.9)* | 32<br>*(−0.3)* | 28.845<br>*(97.405)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 17.14<br>*(12.78)* | 1089<br>*(4.84)* | 5.91<br>*(9.50)* | 2097 | 3.49 | 1.631<br>*(6.173)* | 0.656<br>*(0.399)* | 10.51<br>*(2.070)* | 165<br>*(73.9)* | 34<br>*(0.8)* | 34<br>*(1.1)* | 29.155<br>*(98.452)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 17.14<br>*(12.78)* | 1089<br>*(4.84)* | 5.90<br>*(9.50)* | 1679 | 3.35 | 1.414<br>*(5.351)* | 0.569<br>*(0.346)* | 12.13<br>*(2.389)* | 166<br>*(74.4)* | 34<br>*(1.1)* | 35<br>*(1.7)* | 29.085<br>*(98.216)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 21.57<br>*(16.08)* | 4473<br>*(19.89)* | 1.81<br>*(2.91)* | 2084 | 14.89 | 2nd Gear | | | 169<br>*(76.1)* | 46<br>*(7.8)* | 49<br>*(9.4)* | 28.840<br>*(97.388)* |
| 29.88<br>*(22.28)* | 3476<br>*(15.46)* | 3.22<br>*(5.19)* | 2002 | 8.96 | 3rd Gear | | | 201<br>*(93.6)* | 62<br>*(16.7)* | 79<br>*(26.1)* | 28.340<br>*(95.700)* |
| 31.02<br>*(23.13)* | 2562<br>*(11.39)* | 4.54<br>*(7.31)* | 2000 | 6.71 | 4th Gear | | | 199<br>*(92.5)* | 61<br>*(16.1)* | 76<br>*(24.4)* | 28.330<br>*(95.666)* |
| 31.45<br>*(23.45)* | 2137<br>*(9.50)* | 5.52<br>*(8.88)* | 2001 | 5.45 | 5th Gear | | | 190<br>*(87.8)* | 58<br>*(14.4)* | 69<br>*(20.6)* | 28.310<br>*(95.599)* |
| 31.02<br>*(23.13)* | 1666<br>*(7.41)* | 6.98<br>*(11.24)* | 2000 | 4.10 | 6th Gear | | | 195<br>*(90.3)* | 60<br>*(15.6)* | 73<br>*(22.8)* | 28.320<br>*(95.632)* |

**Department of Agricultural Engineering**

**Dates of Test:** March 17 to April 15, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8284 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.447 gal *(5.476 l)* **Drained from motor** 1.089 gal *(4.121 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 47.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** three cylinder vertical **Serial No.** *B638764* **Crankshaft** lengthwise **Rated rpm** 2000 **Bore and stroke** 4.2" × 4.2" *(106.7 mm × 106.7 mm)* **Compression ratio** 17.3 to 1 **Displacement** 175 cu in *(2868 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** radiator for hydraulic and rear axle oil **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** *C680985* **Tread width** rear 56" *(1420 mm)* to 76" *(1930 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 75.8" *(1925 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.5" *(800 mm)* Vertical distance above roadway 25.2" *(640 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.7 *(2.7)* second 2.1 *(3.4)* third 3.6 *(5.8)* fourth 5.0 *(8.0)* fifth 5.9 *(9.5)* sixth 7.4 *(11.9)* seventh 13.0 *(20.9)* eighth 17.7 *(28.5)* reverse 2.4 *(3.9)*, 8.5 *(13.7)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 117" *(2.97 m)* left 117" *(2.97 m)* (on concrete surface without brake) right 129" *(3.28 m)* left 129" *(3.28 m)* **Turning space diameter** (on concrete surface with brake applied) right 240" *(6.1 m)* left 240" *(6.1 m)* (on concrete surface without brake) right 267" *(6.8 m)* left 267" *(6.8 m)* **Power take-off** 540 rpm at 1809 engine rpm.

## LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2001 | 1803 | 1603 | 1407 | 1201 | 986 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 2137<br>*(9.50)* | 2255<br>*(10.03)* | 2326<br>*(10.35)* | 2394<br>*(10.65)* | 2422<br>*(10.77)* | 2414<br>*(10.74)* |
| Increase in Pull % | 0 | 6 | 9 | 12 | 13 | 13 |
| Power—Hp<br>*(kW)* | 31.45<br>*(23.45)* | 29.80<br>*(22.22)* | 27.35<br>*(20.32)* | 24.53<br>*(18.29)* | 21.16<br>*(15.78)* | 17.30<br>*(12.90)* |
| Speed—Mph<br>*(km/h)* | 5.52<br>*(8.88)* | 4.96<br>*(7.97)* | 4.39<br>*(7.07)* | 3.84<br>*(6.18)* | 3.28<br>*(5.27)* | 2.69<br>*(4.32)* |
| Slip % | 5.45 | 5.82 | 6.14 | 6.24 | 6.45 | 6.45 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.0 |
| 75% of Pull at Maximum Power—Ten Hours | 96.0 |
| 50% of Pull at Maximum Power—Two Hours | 95.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 93.5 |
| Bystander in 8th gear | 88.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 14.9-24; 4; 14 *(95)* | Two 14.9-24; 4; 14 *(95)* |
| Ballast | —Liquid (each) | 542 lb *(246 kg)* | None |
| | —Cast Iron (each) | 290 lb *(132 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 5.50-16; 4; 40 *(275)* | Two 5.50-16; 4; 40 *(275)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 58 lb *(26 kg)* | None |
| Height of Drawbar | | 16.5 in *(420 mm)* | 16.5 in *(420 mm)* |
| Static Weight with Operator | —Rear | 4150 lb *(1882 kg)* | 2485 lb *(1127 kg)* |
| | —Front | 1790 lb *(812 kg)* | 1675 lb *(760 kg)* |
| | —Total | 5940 lb *(2694 kg)* | 4160 lb *(1887 kg)* |

**Ford 2610 (8 X 2) Diesel**

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 146°F *(63.4°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.95 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1421**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1422 — FORD 3610 (8 X 2) DIESEL 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—587 rpm)** | | | | | | | | |
| 42.26<br>*(31.51)* | 2000 | 2.704<br>*(10.236)* | 0.441<br>*(0.268)* | 15.63<br>*(3.078)* | 197<br>*(91.7)* | 54<br>*(12.4)* | 75<br>*(24.0)* | 29.037<br>*(98.052)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 40.17<br>*(29.95)* | 1810 | 2.519<br>*(9.535)* | 0.432<br>*(0.263)* | 15.95<br>*(3.141)* | 200<br>*(93.3)* | 54<br>*(12.2)* | 75<br>*(23.9)* | 29.040<br>*(98.064)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 37.14<br>*(27.70)* | 2067 | 2.454<br>*(9.289)* | 0.456<br>*(0.277)* | 15.14<br>*(2.982)* | 188<br>*(86.4)* | 54<br>*(12.2)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2122 | 0.818<br>*(3.096)* | .....<br>..... | .....<br>..... | 168<br>*(75.6)* | 54<br>*(12.2)* | 74<br>*(23.6)* | ......<br>...... |
| 18.81<br>*(14.03)* | 2094 | 1.570<br>*(5.943)* | 0.576<br>*(0.350)* | 11.98<br>*(2.361)* | 170<br>*(76.4)* | 54<br>*(12.2)* | 74<br>*(23.3)* | ......<br>...... |
| 42.48<br>*(31.68)* | 2001 | 2.719<br>*(10.293)* | 0.441<br>*(0.269)* | 15.62<br>*(3.078)* | 196<br>*(91.4)* | 54<br>*(12.2)* | 75<br>*(23.9)* | ......<br>...... |
| 9.48<br>*(7.07)* | 2108 | 1.170<br>*(4.429)* | 0.852<br>*(0.518)* | 8.10<br>*(1.596)* | 168<br>*(75.3)* | 55<br>*(12.8)* | 75<br>*(23.9)* | ......<br>...... |
| 28.05<br>*(20.92)* | 2080 | 2.019<br>*(7.643)* | 0.496<br>*(0.302)* | 13.90<br>*(2.737)* | 173<br>*(78.3)* | 54<br>*(12.5)* | 75<br>*(23.9)* | ......<br>...... |
| Av 22.66<br>*Av (16.90)* | 2079 | 1.792<br>*(6.783)* | 0.545<br>*(0.331)* | 12.65<br>*(2.492)* | 177<br>*(80.6)* | 54<br>*(12.4)* | 75<br>*(23.8)* | 29.070<br>*(98.165)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 35.86<br>*(26.74)* | 2295<br>*(10.21)* | 5.86<br>*(9.43)* | 2000 | 5.63 | 2.683<br>*(10.155)* | 0.516<br>*(0.314)* | 13.37<br>*(2.633)* | 191<br>*(88.3)* | 60<br>*(15.6)* | 70<br>*(20.8)* | 28.815<br>*(97.304)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 28.85<br>*(21.52)* | 1769<br>*(7.87)* | 6.12<br>*(9.84)* | 2057 | 4.26 | 2.273<br>*(8.604)* | 0.543<br>*(0.330)* | 12.69<br>*(2.501)* | 181<br>*(82.7)* | 65<br>*(18.1)* | 75<br>*(23.6)* | 28.675<br>*(96.831)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 19.70<br>*(14.69)* | 1180<br>*(5.25)* | 6.26<br>*(10.08)* | 2077 | 2.84 | 1.758<br>*(6.656)* | 0.616<br>*(0.374)* | 11.20<br>*(2.207)* | 172<br>*(77.8)* | 63<br>*(16.9)* | 75<br>*(23.6)* | 28.780<br>*(97.186)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 19.68<br>*(14.68)* | 1180<br>*(5.25)* | 6.26<br>*(10.07)* | 1662 | 2.78 | 1.559<br>*(5.901)* | 0.546<br>*(0.332)* | 12.63<br>*(2.488)* | 173<br>*(78.3)* | 64<br>*(17.8)* | 79<br>*(25.8)* | 28.750<br>*(97.084)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 25.17<br>*(18.77)* | 4964<br>*(22.08)* | 1.90<br>*(3.06)* | 2058 | 14.75 | 2nd Gear | | | 173<br>*(78.1)* | 55<br>*(12.8)* | 60<br>*(15.6)* | 28.820<br>*(97.321)* |
| 34.69<br>*(25.87)* | 3794<br>*(16.88)* | 3.43<br>*(5.52)* | 2000 | 9.84 | 3rd Gear | | | 182<br>*(83.1)* | 56<br>*(13.3)* | 62<br>*(16.7)* | 28.820<br>*(97.321)* |
| 36.12<br>*(26.94)* | 2809<br>*(12.50)* | 4.82<br>*(7.76)* | 2000 | 6.91 | 4th Gear | | | 187<br>*(85.8)* | 57<br>*(13.9)* | 64<br>*(17.8)* | 28.810<br>*(97.287)* |
| 36.80<br>*(27.44)* | 2358<br>*(10.49)* | 5.85<br>*(9.42)* | 1998 | 5.69 | 5th Gear | | | 186<br>*(85.3)* | 58<br>*(14.4)* | 66<br>*(18.9)* | 28.810<br>*(97.287)* |
| 35.99<br>*(26.84)* | 1821<br>*(8.10)* | 7.41<br>*(11.93)* | 2000 | 4.32 | 6th Gear | | | 185<br>*(85.0)* | 57<br>*(13.9)* | 65<br>*(18.3)* | 28.810<br>*(97.287)* |

## LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 1998 | 1807 | 1603 | 1401 | 1201 | 1007 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 2358<br>*(10.49)* | 2455<br>*(10.92)* | 2580<br>*(11.48)* | 2689<br>*(11.96)* | 2704<br>*(12.03)* | 2676<br>*(11.90)* |
| Increase in Pull % | 0 | 4 | 9 | 14 | 15 | 13 |
| Power—Hp<br>*(kW)* | 36.80<br>*(27.44)* | 34.53<br>*(25.75)* | 32.11<br>*(23.94)* | 29.14<br>*(21.73)* | 25.10<br>*(18.72)* | 20.79<br>*(15.51)* |
| Speed—Mph<br>*(km/h)* | 5.85<br>*(9.42)* | 5.27<br>*(8.49)* | 4.67<br>*(7.51)* | 4.06<br>*(6.54)* | 3.48<br>*(5.60)* | 2.91<br>*(4.69)* |
| Slip % | 5.69 | 5.91 | 6.25 | 6.58 | 6.58 | 6.80 |

**Department of Agricultural Engineering**

**Dates of Test:** April 23 to May 12, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8282 **Fuel weight** 6.896 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.472 gal *(5.572 l)* **Drained from motor** 1.378 gal *(5.217 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 39.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** three cylinder vertical **Serial No.** *C625475* **Crankshaft** lengthwise **Rated rpm** 2000 **Bore and stroke** 4.4" × 4.2" *(112 mm × 107 mm)* **Compression ratio** 16.3 to 1 **Displacement** 192 cu in *(3147 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Oil cooler** radiator for hydraulic and rear axle oil **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** *C681121* **Tread width** rear 60" *(1525 mm)* to 76" *(1930 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 75.8" *(1925 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.3" *(795 mm)* Vertical distance above roadway 25.2" *(640 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.7 *(2.7)* second 2.2 *(3.5)* third 3.8 *(6.1)* fourth 5.2 *(8.4)* fifth 6.2 *(10.0)* sixth 7.8 *(12.5)* seventh 13.7 *(22.0)* eighth 18.6 *(29.9)* reverse 2.5 *(4.0)*, 9.0 *(14.5)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 117" *(2.97 m)* left 117" *(2.97 m)* (on concrete surface without brake) right 129" *(3.28 m)* left 129" *(3.28 m)* **Turning space diameter** (on concrete surface with brake applied) right 240" *(6.1 m)* left 240" *(6.1 m)* (on concrete surface without brake) right 267" *(6.8 m)* left 267" *(6.8 m)* **Power take-off** 540 rpm at 1810 engine rpm.

**REPAIRS and ADJUSTMENTS:** During preliminary pto test the fuel line to number two injector and all fuel injectors were replaced.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.4°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.75 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1422.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.5 |
| 75% of Pull at Maximum Power—Ten Hours | 96.0 |
| 50% of Pull at Maximum Power—Two Hours | 94.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 92.0 |
| Bystander in 8th gear | 85.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 16.9-24; 6; 16 *(110)* | Two 16.9-24; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 692 lb *(314 kg)* | None |
| | —Cast Iron (each) | 280 lb *(127 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 6.50-16; 6; 36 *(250)* | Two 6.50-16; 6; 36 *(250)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 62 lb *(28 kg)* | None |
| Height of Drawbar | | 18 in *(455 mm)* | 18 in *(455 mm)* |
| Static Weight with Operator | —Rear | 4535 lb *(2057 kg)* | 2590 lb *(1175 kg)* |
| | —Front | 1805 lb *(818 kg)* | 1680 lb *(762 kg)* |
| | —Total | 6340 lb *(2876 kg)* | 4270 lb *(1937 kg)* |

Ford 3610 (8 X 2) Diesel

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Kleis, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1423 — FORD 3610 (8 X 4) DIESEL 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—600 rpm)** | | | | | | | | |
| 42.47<br>(31.67) | 2000 | 2.681<br>(10.149) | 0.435<br>(0.265) | 15.84<br>(3.121) | 195<br>(90.7) | 56<br>(13.3) | 75<br>(23.9) | 28.830<br>(97.335) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 40.01<br>(29.84) | 1798 | 2.460<br>(9.312) | 0.424<br>(0.258) | 16.26<br>(3.204) | 197<br>(91.7) | 56<br>(13.3) | 75<br>(23.9) | 28.825<br>(97.338) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 37.24<br>(27.77) | 2062 | 2.388<br>(9.040) | 0.442<br>(0.269) | 15.60<br>(3.072) | 186<br>(85.6) | 56<br>(13.3) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2116 | 0.792<br>(2.998) | .....<br>..... | .....<br>..... | 166<br>(74.2) | 57<br>(13.9) | 75<br>(23.9) | ......<br>...... |
| 18.82<br>(14.03) | 2086 | 1.535<br>(5.811) | 0.563<br>(0.342) | 12.26<br>(2.414) | 170<br>(76.4) | 56<br>(13.3) | 74<br>(23.6) | ......<br>...... |
| 42.58<br>(31.75) | 2000 | 2.706<br>(10.243) | 0.438<br>(0.267) | 15.74<br>(3.100) | 194<br>(89.7) | 57<br>(13.9) | 76<br>(24.4) | ......<br>...... |
| 9.47<br>(7.06) | 2100 | 1.135<br>(4.296) | 0.827<br>(0.503) | 8.34<br>(1.643) | 166<br>(74.7) | 57<br>(13.9) | 75<br>(23.9) | ......<br>...... |
| 28.12<br>(20.97) | 2074 | 1.975<br>(7.476) | 0.484<br>(0.295) | 14.24<br>(2.805) | 173<br>(78.3) | 57<br>(13.9) | 76<br>(24.2) | ......<br>...... |
| **Av 22.70**<br>*Av (16.93)* | **2073** | **1.755**<br>(6.643) | **0.533**<br>(0.324) | **12.94**<br>(2.549) | **176**<br>(79.8) | **57**<br>(13.7) | **75**<br>(24.0) | **28.817**<br>(97.318) |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 34.24<br>(25.53) | 2229<br>(9.92) | 5.76<br>(9.27) | 1999 | 5.64 | 2.665<br>(10.087) | 0.537<br>(0.326) | 12.85<br>(2.531) | 171<br>(77.2) | 40<br>(4.4) | 49<br>(9.4) | 29.205<br>(98.621) |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 27.87<br>(20.79) | 1729<br>(7.69) | 6.05<br>(9.73) | 2067 | 4.18 | 2.240<br>(8.481) | 0.554<br>(0.337) | 12.44<br>(2.451) | 171<br>(77.1) | 46<br>(7.7) | 51<br>(10.7) | 28.625<br>(96.662) |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 18.90<br>(14.09) | 1152<br>(5.12) | 6.15<br>(9.90) | 2077 | 3.00 | 1.795<br>(6.793) | 0.655<br>(0.398) | 10.53<br>(2.075) | 168<br>(75.3) | 45<br>(6.9) | 55<br>(12.5) | 28.340<br>(95.700) |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 18.89<br>(14.09) | 1152<br>(5.12) | 6.15<br>(9.90) | 1426 | 2.76 | 1.432<br>(5.421) | 0.523<br>(0.318) | 13.19<br>(2.599) | 169<br>(75.8) | 47<br>(8.1) | 60<br>(15.5) | 28.375<br>(95.818) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 28.87<br>(21.53) | 4917<br>(21.87) | 2.20<br>(3.54) | 2057 | 14.79 | 2nd Gear | | | 171<br>(77.2) | 39<br>(3.9) | 48<br>(8.9) | 29.200<br>(98.604) |
| 34.73<br>(25.90) | 3952<br>(17.58) | 3.30<br>(5.30) | 1999 | 10.29 | 3rd Gear | | | 173<br>(78.1) | 40<br>(4.4) | 49<br>(9.4) | 29.200<br>(98.604) |
| 35.19<br>(26.24) | 2641<br>(11.75) | 5.00<br>(8.04) | 2000 | 6.55 | 4th Gear | | | 173<br>(78.1) | 40<br>(4.4) | 48<br>(8.9) | 29.240<br>(98.739) |
| 35.42<br>(26.41) | 2305<br>(10.25) | 5.76<br>(9.27) | 1999 | 5.64 | 5th Gear | | | 172<br>(77.8) | 40<br>(4.4) | 49<br>(9.4) | 29.200<br>(98.604) |
| 35.57<br>(26.53) | 1569<br>(6.98) | 8.55<br>(13.76) | 2002 | 3.80 | 6th Gear | | | 172<br>(77.8) | 39<br>(3.9) | 47<br>(8.3) | 29.250<br>(98.773) |

**Department of Agricultural Engineering**

**Dates of Test:** March 16 to April 1, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8284 **Fuel weight** 6.897 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.484 gal *(5.617 l)* **Drained from motor** 1.421 gal *(5.379 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 41.0 hours.

**ENGINE: Make** Ford Diesel **Type** three cylinder vertical **Serial No.** *C625475* **Crankshaft** lengthwise **Rated rpm** 2000 **Bore and stroke** 4.4" × 4.2" *(112 mm × 107 mm)* **Compression ratio** 16.3 to 1 **Displacement** 192 cu in *(3147 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** radiator for hydraulic and rear axle oil **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

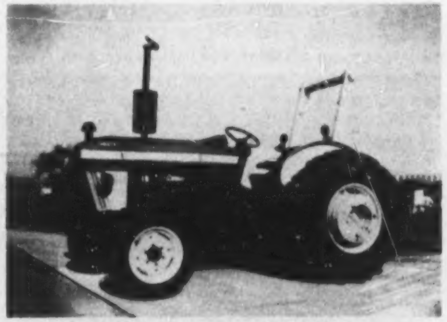
**CHASSIS: Type** standard **Serial No.** *C081344* **Tread width** rear 60" *(1525 mm)* to 76" *(1930 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 75.8" *(1925 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.3" *(795 mm)* Vertical distance above roadway 25,2" *(640 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.7 *(2.7)* second 2.5 *(4.0)* third 3.7 *(5.9)* fourth 5.4 *(8.7)* fifth 6.2 *(10.0)* sixth 9.0 *(14.4)* seventh 13.1 *(21.0)* eighth 19.4 *(31.1)* reverse 2.3 *(3.7)*, 3.3 *(5.3)*, 4.8 *(7.7)*, 7.0 *(11.3)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 117" *(2.97 m)* left 117" *(2.97 m)* (on concrete surface without brake) right 129" *(3.28 m)* left 129" *(3.28 m)* **Turning space diameter** (on concrete surface with brake applied) right 240" *(6.1 m)* left 240" *(6.1 m)* (on concrete surface without brake) right 267" *(6.8 m)* left 267" *(6.8 m)* **Power take-off** 540 rpm at 1798 engine rpm.

## LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 1999 | 1801 | 1604 | 1399 | 1199 | 1009 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 2305<br>(10.25) | 2389<br>(10.63) | 2528<br>(11.25) | 2641<br>(11.75) | 2687<br>(11.95) | 2673<br>(11.89) |
| Increase in Pull % | 0 | 4 | 10 | 15 | 17 | 16 |
| Power—Hp<br>*(kW)* | 35.42<br>(26.41) | 32.92<br>(24.55) | 30.88<br>(23.03) | 28.08<br>(20.94) | 24.39<br>(18.19) | 20.49<br>(15.28) |
| Speed—Mph<br>*(km/h)* | 5.76<br>(9.27) | 5.17<br>(8.32) | 4.58<br>(7.37) | 3.99<br>(6.42) | 3.40<br>(5.48) | 2.87<br>(4.63) |
| Slip % | 5.64 | 5.86 | 6.31 | 6.75 | 6.97 | 6.75 |

| TRACTOR SOUND LEVEL WITH OUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.0 |
| 75% of Pull at Maximum Power—Ten Hours | 95.5 |
| 50% of Pull at Maximum Power—Two Hours | 94.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 92.0 |
| Bystander in 7th gear | 86.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Two 16.9-24; 6; 16 *(110)* | Two 16.9-24; 6; 16 *(110)* |
| **Ballast** | —Liquid (each) | 685 lb *(311 kg)* | None |
| | —Cast iron (each) | 280 lb *(127 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 6.50-16; 6; 36 *(250)* | Two 6.50-16; 6; 36 *(250)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Cast Iron (each) | 58 lb *(26 kg)* | None |
| **Height of Drawbar** | | 18 in *(455 mm)* | 18 in *(455 mm)* |
| **Static Weight with Operator** | —Rear | 4540 lb *(2059 kg)* | 2610 lb *(1184 kg)* |
| | —Front | 1800 lb *(817 kg)* | 1685 lb *(764 kg)* |
| | —Total | 6340 lb *(2876 kg)* | 4295 lb *(1948 kg)* |



Ford 3610 (8 X 4) Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.3°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1423**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1424 — FORD 4110 (8 X 2) DIESEL 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—660 rpm)** | | | | | | | | |
| 48.33 *(36.04)* | 2200 | 3.065 *(11.602)* | 0.437 *(0.266)* | 15.77 *(3.106)* | 201 *(93.7)* | 54 *(12.1)* | 75 *(24.0)* | 29.220 *(98.672)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 42.65 *(31.80)* | 1799 | 2.605 *(9.861)* | 0.421 *(0.256)* | 16.37 *(3.225)* | 204 *(95.5)* | 54 *(12.0)* | 75 *(23.9)* | 29.205 *(98.621)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 42.61 *(31.77)* | 2262 | 2.814 *(10.652)* | 0.456 *(0.277)* | 15.14 *(2.983)* | 192 *(89.2)* | 56 *(13.1)* | 76 *(24.7)* | ...... |
| 0.00 *(0.00)* | 2320 | 0.986 *(3.637)* | ..... | ..... | 170 *(76.9)* | 54 *(12.2)* | 74 *(23.6)* | ...... |
| 21.46 *(16.00)* | 2298 | 1.823 *(6.901)* | 0.586 *(0.356)* | 11.77 *(2.319)* | 173 *(78.3)* | 54 *(11.9)* | 74 *(23.6)* | ...... |
| 48.78 *(36.38)* | 2201 | 3.080 *(11.659)* | 0.435 *(0.265)* | 15.84 *(3.120)* | 200 *(93.3)* | 54 *(12.5)* | 76 *(24.7)* | ...... |
| 10.87 *(8.11)* | 2325 | 1.388 *(5.254)* | 0.881 *(0.536)* | 7.83 *(1.544)* | 169 *(76.1)* | 54 *(11.9)* | 75 *(23.9)* | ...... |
| 32.20 *(24.01)* | 2300 | 2.262 *(8.563)* | 0.484 *(0.295)* | 14.24 *(2.804)* | 177 *(80.6)* | 54 *(11.9)* | 74 *(23.6)* | ...... |
| Av 25.99 Av *(19.38)* | 2288 | 2.055 *(7.779)* | 0.546 *(0.332)* | 12.64 *(2.491)* | 180 *(82.4)* | 54 *(12.3)* | 75 *(24.1)* | 29.143 *(98.413)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 40.60 *(30.28)* | 3370 *(14.99)* | 4.52 *(7.27)* | 2202 | 7.87 | 3.063 *(11.594)* | 0.520 *(0.316)* | 13.26 *(2.611)* | 195 *(90.3)* | 50 *(9.7)* | 68 *(19.7)* | 28.945 *(97.743)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 33.18 *(24.74)* | 2570 *(11.43)* | 4.84 *(7.79)* | 2303 | 5.67 | 2.690 *(10.183)* | 0.559 *(0.340)* | 12.34 *(2.430)* | 183 *(83.7)* | 53 *(11.7)* | 70 *(20.8)* | 28.733 *(97.027)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 22.81 *(17.01)* | 1715 *(7.63)* | 4.99 *(8.03)* | 2330 | 4.03 | 2.120 *(8.027)* | 0.641 *(0.390)* | 10.76 *(2.119)* | 174 *(78.6)* | 61 *(16.1)* | 73 *(22.8)* | 28.085 *(94.839)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 22.81 *(17.01)* | 1716 *(7.63)* | 4.99 *(8.02)* | 1864 | 3.86 | 1.849 *(6.999)* | 0.550 *(0.340)* | 12.34 *(2.431)* | 178 *(80.8)* | 63 *(17.2)* | 78 *(25.6)* | 27.975 *(94.467)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|
| 23.22 *(17.31)* | 5681 *(25.27)* | 1.53 *(2.47)* | 2314 | 14.91 | 2nd Gear | 173 *(78.1)* | 63 *(17.2)* | 67 *(19.4)* | 28.180 *(95.160)* |
| 37.47 *(27.94)* | 5449 *(24.24)* | 2.58 *(4.15)* | 2200 | 14.13 | 3rd Gear | 191 *(88.3)* | 64 *(17.8)* | 69 *(20.6)* | 28.150 *(95.058)* |
| 40.29 *(30.05)* | 4080 *(18.15)* | 3.70 *(5.96)* | 2203 | 9.52 | 4th Gear | 194 *(89.7)* | 48 *(8.9)* | 65 *(18.3)* | 28.950 *(97.760)* |
| 41.25 *(30.76)* | 3426 *(15.24)* | 4.51 *(7.27)* | 2199 | 7.85 | 5th Gear | 192 *(88.9)* | 47 *(8.3)* | 63 *(17.2)* | 28.980 *(97.860)* |
| 40.88 *(30.48)* | 2664 *(11.85)* | 5.75 *(9.26)* | 2202 | 6.01 | 6th Gear | 192 *(88.6)* | 48 *(8.9)* | 64 *(17.8)* | 28.960 *(97.794)* |

## LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2199 | 1982 | 1769 | 1534 | 1317 | 1099 | 889 |
|---|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 3426 *(15.24)* | 3571 *(15.88)* | 3714 *(16.52)* | 3796 *(16.89)* | 3864 *(17.19)* | 3974 *(17.68)* | 3929 *(17.48)* |
| Increase in Pull % | 0 | 4 | 8 | 11 | 13 | 16 | 15 |
| Power—Hp *(kW)* | 41.25 *(30.76)* | 38.78 *(28.92)* | 35.65 *(26.58)* | 31.49 *(23.48)* | 27.43 *(20.46)* | 23.47 *(17.50)* | 18.80 *(14.02)* |
| Speed—Mph *(km/h)* | 4.51 *(7.27)* | 4.07 *(6.55)* | 3.60 *(5.79)* | 3.11 *(5.01)* | 2.66 *(4.28)* | 2.21 *(3.56)* | 1.79 *(2.89)* |
| Slip % | 7.85 | 8.32 | 8.64 | 8.85 | 9.16 | 9.46 | 9.46 |

**Department of Agricultural Engineering**

**Dates of Test:** March 18 to April 8, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8284 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.476 gal *(5.586 l)* **Drained from motor** 1.247 gal *(4.721 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 45.5 hours.

**ENGINE: Make** Ford Diesel **Type** three cylinder vertical **Serial No.** *K629779* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 16.3 to 1 **Displacement** 201 cu in *(3294 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard **Serial No.** *C680986* **Tread width** rear 64" *(1625 mm)* to 80" *(2032 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 77.5" *(1969 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.8" *(732 mm)* Vertical distance above roadway 28.3" *(719 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.4 *(2.2)* second 1.7 *(2.8)* third 3.1 *(5.0)* fourth 4.2 *(6.7)* fifth 5.0 *(8.0)* sixth 6.2 *(10.0)* seventh 11.0 *(17.7)* eighth 14.9 *(24.0)* reverse 2.0 *(3.2)*, 7.2 *(11.6)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 114" *(2.89 m)* left 114" *(2.89 m)* (on concrete surface without brake) right 136" *(3.45 m)* left 136" *(3.45 m)* **Turning space diameter** (on concrete surface with brake applied) right 233" *(5.92 m)* left 233" *(5.92 m)* (on concrete surface without brake) right 275" *(6.98 m)* left 275" *(6.98 m)* **Power take-off** 540 rpm at 1799 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 150°F *(65.3°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 97.5 |
| 75% of Pull at Maximum Power—Ten Hours | 97.5 |
| 50% of Pull at Maximum Power—Two Hours | 95.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 94.5 |
| Bystander in 8th gear | 88.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 16.9-24; 6; 16 *(110)* | Two 16.9-24; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 686 lb *(311 kg)* | None |
| | —Cast Iron (each) | 680 lb *(308 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-16; 6; 40 *(275)* | Two 7.50-16; 6; 40 *(275)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 60 lb *(27 kg)* | None |
| Height of Drawbar | | 15.5 in *(395 mm)* | 15.5 in *(395 mm)* |
| Static Weight with Operator | —Rear | 5700 lb *(2586 kg)* | 2970 lb *(1347 kg)* |
| | —Front | 1800 lb *(816 kg)* | 1680 lb *(762 kg)* |
| | —Total | 7500 lb *(3402 kg)* | 4650 lb *(2109 kg)* |

Ford 4110 (8 X 2) Diesel

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1424.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Kleis, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1425 — FORD 4110 (8 X 4) DIESEL
## 8 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—660 rpm)** | | | | | | | | |
| 49.26<br>*(36.73)* | 2200 | 3.165<br>*(11.981)* | 0.443<br>*(0.270)* | 15.57<br>*(3.066)* | 204<br>*(95.4)* | 59<br>*(14.9)* | 76<br>*(24.2)* | 29.000<br>*(97.929)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 44.06<br>*(32.86)* | 1799 | 2.744<br>*(10.387)* | 0.429<br>*(0.261)* | 16.06<br>*(3.164)* | 205<br>*(96.1)* | 59<br>*(14.9)* | 75<br>*(23.8)* | 28.990<br>*(97.895)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 43.17<br>*(32.19)* | 2268 | 2.893<br>*(10.951)* | 0.402<br>*(0.281)* | 14.92<br>*(2.939)* | 192<br>*(89.2)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2326 | 1.031<br>*(3.903)* | .....<br>..... | .....<br>..... | 170<br>*(76.9)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| 21.87<br>*(16.31)* | 2300 | 1.901<br>*(7.196)* | 0.599<br>*(0.365)* | 11.51<br>*(2.267)* | 175<br>*(79.4)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| 49.83<br>*(37.16)* | 2199 | 3.189<br>*(12.072)* | 0.441<br>*(0.268)* | 15.63<br>*(3.078)* | 201<br>*(93.9)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| 11.01<br>*(8.21)* | 2312 | 1.449<br>*(5.485)* | 0.907<br>*(0.552)* | 7.60<br>*(1.497)* | 168<br>*(75.6)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| 32.61<br>*(24.32)* | 2284 | 2.397<br>*(9.074)* | 0.507<br>*(0.308)* | 13.60<br>*(2.680)* | 177<br>*(80.6)* | 59<br>*(15.0)* | 75<br>*(23.9)* | ......<br>...... |
| Av 26.14<br>Av *(19.49)* | 2282 | 2.143<br>*(8.112)* | 0.560<br>*(0.340)* | 12.32<br>*(2.427)* | 181<br>*(82.6)* | 59<br>*(15.0)* | 75<br>*(23.9)* | 28.997<br>*(97.917)* |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 39.80<br>*(29.68)* | 3023<br>*(13.44)* | 4.94<br>*(7.95)* | 2201 | 6.54 | 3.081<br>*(11.663)* | 0.534<br>*(0.325)* | 12.92<br>*(2.544)* | 189<br>*(87.2)* | 61<br>*(16.1)* | 65<br>*(18.3)* | 28.790<br>*(97.220)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 32.18<br>*(23.99)* | 2318<br>*(10.31)* | 5.21<br>*(8.38)* | 2279 | 4.85 | 2.654<br>*(10.045)* | 0.569<br>*(0.346)* | 12.13<br>*(2.389)* | 178<br>*(80.9)* | 62<br>*(16.8)* | 68<br>*(19.7)* | 28.725<br>*(97.000)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 21.76<br>*(16.23)* | 1546<br>*(6.87)* | 5.28<br>*(8.50)* | 2276 | 3.35 | 2.085<br>*(7.891)* | 0.661<br>*(0.402)* | 10.44<br>*(2.056)* | 177<br>*(80.3)* | 68<br>*(20.0)* | 75<br>*(23.9)* | 28.760<br>*(97.118)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 21.77<br>*(16.23)* | 1546<br>*(6.88)* | 5.28<br>*(8.50)* | 1563 | 3.21 | 1.686<br>*(6.381)* | 0.534<br>*(0.325)* | 12.91<br>*(2.543)* | 174<br>*(78.9)* | 69<br>*(20.3)* | 74<br>*(23.3)* | 28.730<br>*(97.017)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 29.05<br>*(21.66)* | 5691<br>*(25.31)* | 1.91<br>*(3.08)* | 2272 | 14.74 | 2nd Gear | | | 175<br>*(79.2)* | 59<br>*(15.0)* | 60<br>*(15.6)* | 28.760<br>*(97.118)* |
| 37.88<br>*(28.24)* | 5188<br>*(23.08)* | 2.74<br>*(4.41)* | 2199 | 13.82 | 3rd Gear | | | 190<br>*(87.8)* | 64<br>*(17.8)* | 69<br>*(20.6)* | 28.810<br>*(97.287)* |
| 39.65<br>*(29.57)* | 3480<br>*(15.48)* | 4.27<br>*(6.88)* | 2202 | 7.76 | 4th Gear | | | 191<br>*(88.1)* | 65<br>*(18.3)* | 70<br>*(21.1)* | 28.800<br>*(97.253)* |
| 40.59<br>*(30.27)* | 3091<br>*(13.75)* | 4.92<br>*(7.92)* | 2200 | 6.79 | 5th Gear | | | 195<br>*(90.8)* | 65<br>*(18.3)* | 71<br>*(21.7)* | 28.800<br>*(97.253)* |
| 39.97<br>*(29.81)* | 2038<br>*(9.07)* | 7.36<br>*(11.84)* | 2200 | 4.22 | 6th Gear | | | 193<br>*(89.2)* | 66<br>*(18.9)* | 73<br>*(22.8)* | 28.790<br>*(97.220)* |

### LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2200 | 1985 | 1762 | 1546 | 1323 | 1110 | 882 |
|---|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 3091<br>*(13.75)* | 3280<br>*(14.59)* | 3420<br>*(15.21)* | 3533<br>*(15.72)* | 3641<br>*(16.20)* | 3655<br>*(16.26)* | 3509<br>*(15.61)* |
| Increase in Pull % | 0 | 6 | 11 | 14 | 18 | 18 | 14 |
| Power—Hp *(kW)* | 40.59<br>*(30.27)* | 38.85<br>*(28.97)* | 35.66<br>*(26.59)* | 32.18<br>*(24.00)* | 28.29<br>*(21.10)* | 23.79<br>*(17.74)* | 18.22<br>*(13.59)* |
| Speed—Mph *(km/h)* | 4.92<br>*(7.92)* | 4.44<br>*(7.15)* | 3.91<br>*(6.29)* | 3.42<br>*(5.50)* | 2.91<br>*(4.69)* | 2.44<br>*(3.93)* | 1.95<br>*(3.13)* |
| Slip % | 6.79 | 7.11 | 7.54 | 7.86 | 8.29 | 8.29 | 8.08 |

**Department of Agricultural Engineering**

**Dates of Test:** April 23 to May 14, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8282 **Fuel weight** 6.896 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.353 gal *(5.120 l)* **Drained from motor** 1.151 gal *(4.357 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 43.0 hours.

**ENGINE: Make** Ford Diesel **Type** three cylinder vertical **Serial No.** *K629779* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 16.3 to 1 **Displacement** 201 cu in *(3294 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard **Serial No.** *C681208* **Tread width** rear 64" *(1625 mm)* to 80" *(2032 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 77.5" *(1969 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.8" *(732 mm)* Vertical distance above roadway 28.3" *(719 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.4 *(2.2)* second 2.2 *(3.5)* third 3.2 *(5.1)* fourth 4.7 *(7.6)* fifth 5.4 *(8.7)* sixth 7.9 *(12.7)* seventh 11.5 *(18.5)* eighth 16.8 *(27.0)* reverse 2.0 *(3.2)*, 2.9 *(4.7)*, 4.2 *(6.7)*, 6.1 *(9.8)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 114" *(2.89 m)* left 114" *(2.89 m)* (on concrete surface without brake) right 136" *(3.45 m)* left 136" *(3.45 m)* **Turning space diameter** (on concrete surface with brake applied) right 233" *(5.92 m)* left 233" *(5.92 m)* (on concrete surface without brake) right 275" *(6.98 m)* left 275" *(6.98 m)* **Power take-off** 540 rpm at 1799 engine rpm.

**REPAIRS and ADJUSTMENTS:** The radiator fan shroud was replaced following the limber up period. All fuel injectors were replaced during preliminary PTO tests.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.5 |
| 75% of Pull at Maximum Power—Ten Hours | 95.0 |
| 50% of Pull at Maximum Power—Two Hours | 94.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 92.0 |
| Bystander in 8th gear | 81.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Two 16.9-24; 6; 16 *(110)* | Two 16.9-24; 6; 16 *(110)* |
| **Ballast** | —Liquid (each) | 648 lb *(294 kg)* | None |
| | —Cast Iron (each) | 680 lb *(308 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 7.50-16; 6; 40 *(275)* | Two 7.50-16; 6; 40 *(275)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Cast Iron (each) | 65 lb *(29 kg)* | None |
| **Height of Drawbar** | | 15.5 in *(395 mm)* | 15.5 in *(395 mm)* |
| **Static Weight with Operator** | —Rear | 5665 lb *(2570 kg)* | 3010 lb *(1366 kg)* |
| | —Front | 1835 lb *(832 kg)* | 1705 lb *(773 kg)* |
| | —Total | 7500 lb *(3402 kg)* | 4715 lb *(2139 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 151°F *(66.0°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The fuel tank level indicator did not function during test.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1425.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**Ford 4110 (8 X 4) Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1426 — FORD 4610 (8 X 2) DIESEL
# ALSO FORD 4610 SU (8 X 2) DIESEL
# 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—660 rpm)** | | | | | | | | |
| 52.52<br>(39.16) | 2200 | 3.287<br>(12.443) | 0.432<br>(0.263) | 15.98<br>(3.147) | 193<br>(89.4) | 52<br>(11.2) | 75<br>(24.0) | 29.053<br>(98.109) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 46.72<br>(34.84) | 1799 | 2.784<br>(10.539) | 0.411<br>(0.250) | 16.78<br>(3.306) | 193<br>(89.2) | 52<br>(11.2) | 75<br>(23.9) | 29.015<br>(97.979) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 45.75<br>(34.12) | 2254 | 2.936<br>(11.114) | 0.443<br>(0.269) | 15.58<br>(3.070) | 182<br>(83.3) | 52<br>(11.1) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2331 | 0.940<br>(3.558) | ......<br>...... | ......<br>...... | 168<br>(75.6) | 52<br>(11.1) | 75<br>(23.9) | ......<br>...... |
| 23.32<br>(17.39) | 2300 | 1.862<br>(7.048) | 0.551<br>(0.335) | 12.53<br>(2.467) | 170<br>(76.9) | 52<br>(11.4) | 75<br>(23.9) | ......<br>...... |
| 53.10<br>(39.60) | 2200 | 3.336<br>(12.628) | 0.433<br>(0.264) | 15.92<br>(3.136) | 190<br>(87.8) | 53<br>(11.7) | 76<br>(24.4) | ......<br>...... |
| 11.75<br>(8.76) | 2316 | 1.370<br>(5.186) | 0.805<br>(0.489) | 8.57<br>(1.689) | 168<br>(75.3) | 52<br>(11.1) | 75<br>(23.9) | ......<br>...... |
| 34.68<br>(25.86) | 2280 | 2.353<br>(8.907) | 0.468<br>(0.285) | 14.74<br>(2.903) | 174<br>(78.6) | 52<br>(11.4) | 76<br>(24.2) | ......<br>...... |
| Av 28.10<br>Av (20.95) | 2280 | 2.133<br>(8.074) | 0.524<br>(0.318) | 13.17<br>(2.595) | 175<br>(79.6) | 52<br>(11.3) | 75<br>(24.1) | 28.973<br>(97.839) |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 44.28<br>(33.02) | 3203<br>(14.25) | 5.18<br>(8.34) | 2198 | 5.21 | 3.172<br>(12.008) | 0.494<br>(0.301) | 13.96<br>(2.750) | 174<br>(78.9) | 40<br>(4.4) | 49<br>(9.4) | 29.115<br>(98.317) |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 35.77<br>(26.68) | 2466<br>(10.97) | 5.44<br>(8.75) | 2281 | 4.17 | 2.701<br>(10.224) | 0.521<br>(0.317) | 13.25<br>(2.609) | 171<br>(77.3) | 34<br>(0.9) | 40<br>(4.3) | 29.102<br>(98.577) |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 24.39<br>(18.19) | 1630<br>(7.29) | 5.58<br>(8.98) | 2308 | 2.89 | 2.105<br>(7.959) | 0.595<br>(0.362) | 11.60<br>(2.285) | 172<br>(77.5) | 39<br>(3.9) | 41<br>(5.0) | 28.800<br>(97.253) |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 24.45<br>(18.22) | 1642<br>(7.30) | 5.58<br>(8.98) | 1850 | 2.95 | 1.940<br>(7.342) | 0.548<br>(0.333) | 12.60<br>(2.481) | 168<br>(75.6) | 40<br>(4.2) | 43<br>(5.8) | 28.820<br>(97.321) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 29.19<br>(21.77) | 6402<br>(28.48) | 1.71<br>(2.75) | 2274 | 13.54 | 2nd Gear | 172<br>(77.8) | 50<br>(10.0) | 58<br>(14.4) | 28.570<br>(96.477) |
| 42.63<br>(31.79) | 5265<br>(23.41) | 3.04<br>(4.89) | 2200 | 9.55 | 3rd Gear | 177<br>(80.3) | 50<br>(10.0) | 58<br>(14.4) | 28.580<br>(96.510) |
| 43.71<br>(32.59) | 3839<br>(17.07) | 4.27<br>(6.87) | 2201 | 6.00 | 4th Gear | 178<br>(81.1) | 50<br>(10.0) | 59<br>(15.0) | 28.590<br>(96.544) |
| 44.51<br>(33.19) | 3226<br>(14.35) | 5.17<br>(8.33) | 2200 | 5.49 | 5th Gear | 180<br>(81.9) | 50<br>(10.0) | 59<br>(15.0) | 28.620<br>(96.645) |
| 43.89<br>(32.73) | 2516<br>(11.19) | 6.54<br>(10.53) | 2198 | 4.10 | 6th Gear | 177<br>(80.3) | 50<br>(10.0) | 59<br>(15.0) | 28.600<br>(96.578) |

**Department of Agricultural Engineering**

**Dates of Test:** March 16 to April 1, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8284 **Fuel weight** 6.897 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.672 gal *(6.329 l)* **Drained from motor** 1.349 gal *(5.105 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 44.0 hours.

**ENGINE:** **Make** Ford Diesel **Type** three cylinder vertical **Serial No.** D627302 **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 15.3 to 1 **Displacement** 201 cu in *(3294 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** radiator for power steering oil **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** *C680987* **Tread width** rear 64" *(1625 mm)* to 80" *(2032 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 84.5" *(2146 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.9" *(734 mm)* Vertical distance above roadway 29.8" *(757 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 1.6 *(2.5)* second 2.0 *(3.1)* third 3.4 *(5.5)* fourth 4.7 *(7.5)* fifth 5.6 *(9.0)* sixth 7.0 *(11.3)* seventh 12.3 *(19.8)* eighth 16.7 *(26.9)* reverse 2.3 *(3.6)*, 8.1 *(13.0)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 120" *(3.05 m)* left 120" *(3.05 m)* (on concrete surface without brake) right 138" *(3.51 m)* left 138" *(3.51 m)* **Turning space diameter** (on concrete surface with brake applied) right 252" *(6.4 m)* left 252" *(6.4 m)* (on concrete surface without brake) right 291" *(7.4 m)* left 291" *(7.4 m)* **Power take-off** 540 rpm at 1799 engine rpm.

## LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2200 | 1979* | 1766 | 1547 | 1325 | 1098 | 911 |
|---|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 3226<br>(14.35) | 3529<br>(15.70) | 3650<br>(16.24) | 3792<br>(16.87) | 3863<br>(17.18) | 3906<br>(17.37) | 3792<br>(16.87) |
| Increase in Pull % | 0 | 9 | 13 | 18 | 20 | 21 | 18 |
| Power—Hp<br>(kW) | 44.51<br>(33.19) | 43.52<br>(32.45) | 40.09<br>(29.89) | 36.34<br>(27.10) | 31.67<br>(23.62) | 26.52<br>(19.78) | 21.38<br>(15.94) |
| Speed—Mph<br>(km/h) | 5.17<br>(8.33) | 4.62<br>(7.44) | 4.12<br>(6.63) | 3.59<br>(5.78) | 3.07<br>(4.95) | 2.55<br>(4.10) | 2.11<br>(3.40) |
| Slip % | 5.49 | 6.05 | 6.17 | 5.54 | 6.78 | 6.66 | 6.78 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 97.5 |
| 75% of Pull at Maximum Power—Ten Hours | 96.5 |
| 50% of Pull at Maximum Power—Two Hours | 95.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 94.5 |
| Bystander in 8th gear | 90.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 16.9-30; 6; 16 *(110)* | Two 16.9-30; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 755 lb *(343 kg)* | None |
| | —Cast Iron (each) | 640 lb *(290 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-16; 6; 44 *(305)* | Two 7.50-16; 6; 44 *(305)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 152 lb *(69 kg)* | None |
| Height of Drawbar | | 21 in *(535 mm)* | 21 in *(535 mm)* |
| Static Weight with Operator—Rear | | 6200 lb *(2812 kg)* | 3410 lb *(1547 kg)* |
| —Front | | 1990 lb *(903 kg)* | 1685 lb *(764 kg)* |
| —Total | | 8190 lb *(3715 kg)* | 5095 lb *(2311 kg)* |

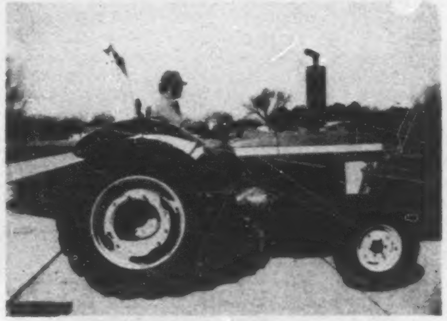
**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.7°C)*. Five gears were chosen between stability limit and 10 mph *(16.1 km/h)*

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1426**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Ford 4610 (8 X 2) Diesel

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Klein, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1427 — FORD 4610 (8 X 4) DIESEL
# ALSO FORD 4610 SU (8 X 4) DIESEL
# 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—660 rpm)** | | | | | | | | |
| 52.32<br>*(39.02)* | 2200 | 3.277<br>*(12.405)* | 0.452<br>*(0.263)* | 15.97<br>*(3.146)* | 194<br>*(89.9)* | 55<br>*(12.8)* | 75<br>*(23.8)* | 29.240<br>*(98.740)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 47.30<br>*(35.27)* | 1798 | 2.810<br>*(10.637)* | 0.410<br>*(0.249)* | 16.83<br>*(3.316)* | 195<br>*(90.7)* | 56<br>*(13.3)* | 75<br>*(23.9)* | 29.250<br>*(98.773)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 45.45<br>*(33.89)* | 2249 | 2.941<br>*(11.133)* | 0.446<br>*(0.271)* | 15.45<br>*(3.044)* | 185<br>*(85.0)* | 56<br>*(13.3)* | 74<br>*(23.6)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2333 | 0.953<br>*(3.607)* | .....<br>..... | .....<br>..... | 170<br>*(76.9)* | 57<br>*(13.9)* | 74<br>*(23.3)* | ......<br>...... |
| 23.26<br>*(17.34)* | 2302 | 1.875<br>*(7.098)* | 0.556<br>*(0.338)* | 12.41<br>*(2.443)* | 172<br>*(77.5)* | 56<br>*(13.6)* | 74<br>*(23.1)* | ......<br>...... |
| 52.98<br>*(39.51)* | 2201 | 3.332<br>*(12.613)* | 0.434<br>*(0.264)* | 15.90<br>*(3.132)* | 190<br>*(87.5)* | 58<br>*(14.4)* | 76<br>*(24.2)* | ......<br>...... |
| 11.70<br>*(8.72)* | 2316 | 1.396<br>*(5.284)* | 0.823<br>*(0.501)* | 8.38<br>*(1.650)* | 172<br>*(78.1)* | 58<br>*(14.4)* | 74<br>*(23.6)* | ......<br>...... |
| 34.49<br>*(25.72)* | 2276 | 2.367<br>*(8.960)* | 0.473<br>*(0.288)* | 14.57<br>*(2.871)* | 174<br>*(79.2)* | 59<br>*(15.0)* | 76<br>*(24.2)* | ......<br>...... |
| **Av 27.98**<br>*Av (20.86)* | **2280** | **2.144**<br>*(8.116)* | **0.528**<br>*(0.321)* | **13.05**<br>*(2.570)* | 177<br>*(80.7)* | 57<br>*(14.1)* | 75<br>*(23.7)* | **29.230**<br>*(98.707)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.h *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 43.17<br>*(32.19)* | 2874<br>*(12.78)* | 5.63<br>*(9.07)* | 2198 | 4.51 | 3.190<br>*(12.076)* | 0.510<br>*(0.310)* | 13.53<br>*(2.666)* | 185<br>*(84.7)* | 64<br>*(17.5)* | 68<br>*(19.7)* | 28.690<br>*(96.882)* |
| **75% of Pull at Maximum Power—Ten Hours 5th Gear** | | | | | | | | | | | |
| 33.76<br>*(25.18)* | 2164<br>*(9.63)* | 5.85<br>*(9.42)* | 2263 | 3.65 | 2.643<br>*(10.004)* | 0.540<br>*(0.328)* | 12.77<br>*(2.517)* | 175<br>*(79.6)* | 63<br>*(17.0)* | 66<br>*(18.7)* | 28.665<br>*(96.797)* |
| **50% of Pull at Maximum Power—Two Hours 5th Gear** | | | | | | | | | | | |
| 23.09<br>*(17.22)* | 1442<br>*(6.41)* | 6.01<br>*(9.67)* | 2292 | 2.30 | 2.066<br>*(7.822)* | 0.617<br>*(0.375)* | 11.18<br>*(2.201)* | 173<br>*(78.3)* | 65<br>*(18.1)* | 70<br>*(20.8)* | 28.685<br>*(96.865)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 6th Gear** | | | | | | | | | | | |
| 23.09<br>*(17.22)* | 1443<br>*(6.42)* | 6.00<br>*(9.66)* | 1575 | 2.20 | 1.686<br>*(6.381)* | 0.504<br>*(0.306)* | 13.69<br>*(2.698)* | 171<br>*(77.2)* | 65<br>*(18.3)* | 71<br>*(21.7)* | 28.660<br>*(96.781)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 37.16<br>*(27.71)* | 6534<br>*(29.06)* | 2.13<br>*(3.43)* | 2227 | 13.31 | 2nd Gear | | | 176<br>*(79.7)* | 62<br>*(16.7)* | 64<br>*(17.8)* | 28.680<br>*(96.848)* |
| 41.71<br>*(31.10)* | 4794<br>*(21.32)* | 3.26<br>*(5.25)* | 2202 | 8.31 | 3rd Gear | | | 182<br>*(83.1)* | 62<br>*(16.7)* | 64<br>*(17.8)* | 28.680<br>*(96.848)* |
| 42.58<br>*(31.75)* | 3266<br>*(14.53)* | 4.89<br>*(7.87)* | 2199 | 5.46 | 4th Gear | | | 182<br>*(83.3)* | 63<br>*(17.2)* | 65<br>*(18.3)* | 28.680<br>*(96.848)* |
| 43.26<br>*(32.26)* | 2885<br>*(12.83)* | 5.62<br>*(9.05)* | 2198 | 4.58 | 5th Gear | | | 183<br>*(83.9)* | 63<br>*(17.2)* | 65<br>*(18.3)* | 28.680<br>*(96.848)* |
| 42.43<br>*(31.64)* | 1912<br>*(8.51)* | 8.32<br>*(13.39)* | 2200 | 3.16 | 6th Gear | | | 181<br>*(82.8)* | 63<br>*(17.2)* | 65<br>*(18.3)* | 28.680<br>*(96.848)* |

**Department of Agricultural Engineering**

**Dates of Test:** April 24 to May 15, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8282 **Fuel weight** 6.896 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.438 gal *(5.444 l)* **Drained from motor** 1.167 gal *(4.416 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 31.5 hours.

**ENGINE: Make** Ford Diesel **Type** three cylinder vertical **Serial No.** D627302 **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 15.3 to 1 **Displacement** 201 cu in *(3294 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** radiator for power steering oil **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard **Serial No.** *C681207* **Tread width** rear 64" *(1625 mm)* to 80" *(2032 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 84.5" *(2146 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 29.7" *(754 mm)* Vertical distance above roadway 29.8" *(757 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph *(km/h)*** first 1.7 *(2.7)* second 2.5 *(4.0)* third 3.6 *(5.8)* fourth 5.3 *(8.5)* fifth 6.0 *(9.7)* sixth 8.8 *(14.2)* seventh 12.9 *(20.8)* eighth 18.8 *(30.2)* reverse 2.2 *(3.6)*, 3.2 *(5.2)*, 4.7 *(7.6)*, 6.8 *(11.0)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 120" *(3.05 m)* left 120" *(3.05 m)* (on concrete surface without brake) right 138" *(3.51 m)* left 138" *(3.51 m)* **Turning space diameter** (on concrete surface with brake applied) right 252" *(6.4 m)* left 252" *(6.4 m)* (on concrete surface without brake) right 291" *(7.4 m)* left 291" *(7.4 m)* **Power take-off** 540 rpm at 1798 engine rpm.

### LUGGING ABILITY IN 5th GEAR

| Crankshaft Speed rpm | 2198 | 1980 | 1760 | 1540 | 1323 | 1106 | 894 |
|---|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 2885<br>*(12.83)* | 3183<br>*(14.16)* | 3311<br>*(14.73)* | 3400<br>*(15.12)* | 3479<br>*(15.48)* | 3489<br>*(15.52)* | 3383<br>*(15.05)* |
| Increase in Pull % | 0 | 10 | 15 | 18 | 21 | 21 | 17 |
| Power—Hp<br>*(kW)* | 43.26<br>*(32.26)* | 42.74<br>*(31.87)* | 39.44<br>*(29.41)* | 35.39<br>*(26.39)* | 31.04<br>*(23.15)* | 26.01<br>*(19.40)* | 20.43<br>*(15.23)* |
| Speed—Mph<br>*(km/h)* | 5.62<br>*(9.05)* | 5.04<br>*(8.10)* | 4.47<br>*(7.19)* | 3.90<br>*(6.28)* | 3.35<br>*(5.39)* | 2.80<br>*(4.50)* | 2.26<br>*(3.64)* |
| Slip % | 4.58 | 5.21 | 5.34 | 5.58 | 5.71 | 5.83 | 5.58 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 97.0 |
| 75% of Pull at Maximum Power—Ten Hours | 97.0 |
| 50% of Pull at Maximum Power—Two Hours | 96.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 95.0 |
| Bystander in 8th gear | 88.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Two 16.9-30; 6; 16 *(110)* | Two 16.9-30; 6; 16 *(110)* |
| **Ballast** | —Liquid (each) | 745 lb *(338 kg)* | None |
| | —Cast Iron (each) | 640 lb *(290 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 7.50-16; 6; 44 *(305)* | Two 7.50-16; 6; 44 *(305)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Cast Iron (each) | 158 lb *(71 kg)* | None |
| **Height of Drawbar** | | 21 in *(535 mm)* | 21 in *(535 mm)* |
| **Static Weight with Operator** | —Rear | 6200 lb *(2812 kg)* | 3430 lb *(1556 kg)* |
| | —Front | 2030 lb *(921 kg)* | 1715 lb *(778 kg)* |
| | —Total | 8230 lb *(3733 kg)* | 5145 lb *(2334 kg)* |

**Ford 4610 (8 X 4) Diesel**

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 142°F *(60.9°C)*. Five gears were chosen between stability limit and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1427.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Kleis, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1428 — FORD 5610 (16 X 4) DIESEL 16 SPEED ALSO 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—596 rpm)** | | | | | | | | |
| 62.54 (46.64) | 2100 | 4.166 (15.770) | 0.459 (0.280) | 15.01 (2.958) | 213 (100.4) | 58 (14.3) | 75 (24.0) | 29.077 (98.188) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 60.58 (45.17) | 1900 | 3.892 (14.733) | 0.443 (0.270) | 15.57 (3.066) | 217 (102.8) | 58 (14.3) | 75 (23.9) | 29.120 (98.334) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 54.82 (40.88) | 2106 | 3.610 (13.665) | 0.454 (0.276) | 15.18 (2.992) | 200 (93.3) | 58 (14.2) | 76 (24.4) | ...... |
| 0.00 (0.00) | 2248 | 1.292 (4.891) | ...... | ...... | 166 (74.4) | 57 (13.9) | 75 (23.9) | ...... |
| 27.97 (20.86) | 2200 | 2.414 (9.138) | 0.595 (0.362) | 11.58 (2.283) | 172 (77.8) | 57 (13.9) | 74 (23.6) | ...... |
| 63.55 (47.39) | 2101 | 4.206 (15.921) | 0.457 (0.278) | 15.11 (2.977) | 207 (97.2) | 58 (14.2) | 75 (23.9) | ...... |
| 14.13 (10.54) | 2232 | 1.814 (6.867) | 0.885 (0.539) | 7.79 (1.535) | 172 (78.1) | 57 (13.9) | 75 (23.9) | ...... |
| 41.50 (30.95) | 2186 | 2.984 (11.295) | 0.496 (0.302) | 13.91 (2.740) | 179 (81.7) | 57 (13.9) | 75 (23.9) | ...... |
| Av 33.66 (25.10) | 2190 | 2.720 (10.296) | 0.557 (0.339) | 12.38 (2.438) | 183 (83.8) | 57 (14.0) | 75 (23.9) | 29.190 (98.570) |

## DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 53.43 (39.84) | 3512 (15.62) | 5.70 (9.18) | 2103 | 5.03 | 4.168 (15.779) | 0.538 (0.327) | 12.82 (2.525) | 216 (102.2) | 60 (15.6) | 82 (27.8) | 28.635 (96.696) |
| **75% of Pull at Maximum Power—Ten Hours 10th (6L) Gear** | | | | | | | | | | | |
| 43.26 (32.26) | 2702 (12.02) | 6.00 (9.66) | 2131 | 3.75 | 3.476 (13.159) | 0.554 (0.337) | 12.44 (2.451) | 188 (86.8) | 63 (17.2) | 72 (22.4) | 28.467 (96.129) |
| **50% of Pull at Maximum Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 29.48 (21.98) | 1803 (8.02) | 6.13 (9.87) | 2205 | 2.67 | 2.864 (10.840) | 0.670 (0.407) | 10.30 (2.028) | 169 (76.1) | 51 (10.3) | 60 (15.3) | 28.780 (97.186) |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 29.45 (21.96) | 1802 (8.01) | 6.13 (9.86) | 1255 | 2.60 | 2.320 (8.782) | 0.543 (0.331) | 12.69 (2.500) | 190 (87.5) | 57 (13.6) | 70 (21.1) | 28.735 (97.034) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 49.71 (37.07) | 7408 (32.95) | 2.52 (4.05) | 2106 | 14.76 | 5th (3L) Gear | 196 (90.8) | 56 (13.3) | 71 (21.7) | 28.830 (97.355) |
| 51.91 (38.71) | 5631 (25.05) | 3.46 (5.56) | 2101 | 8.84 | 6th (3H) Gear | 201 (93.6) | 56 (13.3) | 72 (22.2) | 28.830 (97.355) |
| 53.56 (39.94) | 5469 (24.33) | 3.67 (5.91) | 2100 | 8.51 | 7th (4L) Gear | 202 (94.4) | 57 (13.9) | 73 (22.8) | 28.840 (97.388) |
| 54.23 (40.44) | 4543 (20.21) | 4.48 (7.20) | 2101 | 6.91 | 8th (5L) Gear | 198 (91.9) | 55 (12.8) | 70 (21.1) | 28.870 (97.490) |
| 53.15 (39.64) | 4112 (18.29) | 4.85 (7.80) | 2102 | 6.08 | 9th (4H) Gear | 200 (93.3) | 55 (12.8) | 70 (21.1) | 28.880 (97.523) |
| 54.63 (40.74) | 3603 (16.03) | 5.69 (9.15) | 2100 | 5.24 | 10th (6L) Gear | 200 (93.3) | 55 (12.8) | 70 (21.1) | 28.860 (97.456) |
| 53.81 (40.13) | 3433 (15.27) | 5.88 (9.46) | 2100 | 4.82 | 11th (5H) Gear | 200 (93.1) | 55 (12.8) | 70 (21.1) | 28.840 (97.388) |
| 53.60 (39.97) | 2704 (12.03) | 7.43 (11.96) | 2102 | 3.59 | 12th (6H) Gear | 200 (93.1) | 56 (13.3) | 72 (22.2) | 28.840 (97.388) |

**Department of Agricultural Engineering**

**Dates of Test:** March 25 to April 19, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.745 gal *(6.606 l)* **Drained from motor** 1.436 gal *(5.436 l)* **Transmission and hydraulic lubricant** Ford 134 fluid **Front axle lubricant** Ford EOAZ-19580 fluid **Total time engine was operated** 47.5 hours.

**ENGINE: Make** Ford Diesel **Type** four cylinder vertical **Serial No.** *L627031* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.2" *(112 mm × 107 mm)* **Compression ratio** 16.3 to 1 **Displacement** 256 cu in *(4195 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow paper cartridge **Oil cooler** radiator for hydraulic and transmission oil, radiator for power steering fluid **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** front wheel assist **Serial No.** *C681210* **Tread width** rear 60" *(1525 mm)* to 90" *(2286 mm)* front 60" *(1525 mm)* to 80" *(2032 mm)* **Wheel base** 88.8" *(2255 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.7" *(804 mm)* Vertical distance above roadway 32.9" *(837 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** [illegible] engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.3 *(2.2)* second 1.7 *(2.7)* third 1.7 *(2.8)* fourth 2.2 *(3.5)* fifth 2.9 *(4.7)* sixth 3.8 *(6.1)* seventh 4.0 *(6.5)* eighth 4.8 *(7.8)* ninth 5.2 *(8.4)* tenth 6.0 *(9.7)* eleventh 6.2 *(10.0)* twelfth 7.8 *(12.5)* thirteenth 10.6 *(17.0)* fourteenth 13.6 *(21.8)* fifteenth 14.5 *(23.4)* sixteenth 18.6 *(30.0)* reverse 1.9 *(3.1)*, 2.5 *(4.0)*, 7.0 *(11.2)*, 8.9 *(14.4)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 194" *(4.93 m)* left 194" *(4.93 m)* (on concrete surface without brake) right 209" *(5.30 m)* left 209" *(5.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 395" *(10.03 m)* left 395" *(10.03 m)* (on concrete surface without brake) right 425" *(10.79 m)* left 425" *(10.79 m)* **Power take-off** 540 rpm at 1900 engine rpm.

## LUGGING ABILITY IN 10th (6L) GEAR

| Crankshaft Speed rpm | 2100 | 1890 | 1685 | 1468 | 1271 | 1063 |
|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 3603 (16.03) | 3864 (17.19) | 4064 (18.08) | 4127 (18.36) | 4154 (18.48) | 4083 (18.16) |
| Increase in Pull % | 0 | 7 | 13 | 15 | 15 | 13 |
| Power—Hp (kW) | 54.63 (40.74) | 52.47 (39.13) | 49.03 (36.56) | 43.33 (32.31) | 37.73 (28.14) | 31.03 (23.14) |
| Speed—Mph (km/h) | 5.69 (9.15) | 5.09 (8.19) | 4.52 (7.28) | 3.94 (6.34) | 3.41 (5.48) | 2.85 (4.59) |
| Slip % | 5.24 | 5.59 | 6.01 | 6.01 | 6.15 | 6.15 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 97.0 | 96.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 90.0 |
| 50% of Pull at Maximum Power—Two Hours | | 95.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 91.0 |
| Bystander in 16th (8H) gear | | 89.0 |

## DRAWBAR PERFORMANCE (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 53.27 (39.73) | 3455 (15.37) | 5.78 (9.31) | 2099 | 4.27 | 4.061 (15.373) | 0.533 (0.324) | 13.12 (2.584) | 218 (103.3) | 61 (16.1) | 84 (28.9) | 28.570 (96.477) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 41.02 (30.59) | 8090 (35.99) | 1.90 (3.06) | 2162 | 14.96 | 4th (2H) Gear | 185 (85.0) | 56 (13.3) | 70 (21.1) | 28.830 (97.355) |
| 55.18 (41.15) | 4546 (20.22) | 4.55 (7.33) | 2100 | 5.98 | 8th (5L) Gear | 202 (94.4) | 55 (12.8) | 70 (21.1) | 28.900 (97.591) |
| 54.93 (40.96) | 3567 (15.86) | 5.78 (9.30) | 2100 | 4.34 | 10th (6L) Gear | 201 (93.9) | 55 (12.8) | 70 (21.1) | 28.840 (97.388) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 768 lb *(348 kg)* | None |
| | —Cast Iron (each) | 350 lb *(159 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 13.6-24; 8; 22 *(150)* | Two 13.6-24; 8; 22 *(150)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 45 lb *(20 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator—Rear | | 6980 lb *(3166 kg)* | 4745 lb *(2152 kg)* |
| —Front | | 2720 lb *(1234 kg)* | 2630 lb *(1193 kg)* |
| —Total | | 9700 lb *(4400 kg)* | 7375 lb *(3345 kg)* |

**Ford 5610 (16 X 4) Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

**REPAIRS and ADJUSTMENTS:** All fuel injectors were replaced during preliminary PTO tests.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 152°F *(66.6°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.37 HP-HR per gallon fuel economy at rated engine speedas claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1428.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

# NEBRASKA TRACTOR TEST 1429 — FORD 5610 (16 X 8) DIESEL
## 16 SPEED ALSO 8 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—596 rpm)** | | | | | | | | |
| 62.57<br>(46.66) | 2100 | 4.174<br>(15.800) | 0.460<br>(0.280) | 14.99<br>([illegible]) | 197<br>(91.7) | 57<br>(13.9) | 75<br>(24.1) | 29.325<br>(99.026) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 59.99<br>(44.73) | 1901 | 3.884<br>(14.703) | 0.447<br>(0.272) | 15.45<br>(3.042) | 198<br>(92.1) | 54<br>(12.4) | 74<br>(23.6) | 29.270<br>(98.840) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 54.90<br>(40.94) | 2156 | 3.680<br>(13.930) | 0.462<br>(0.281) | 14.92<br>(2.939) | 186<br>(85.3) | 53<br>(11.7) | 75<br>(23.9) | ……<br>…… |
| 0.00<br>(0.00) | 2225 | 1.308<br>(4.955) | ……<br>…… | ……<br>…… | 167<br>(75.0) | 54<br>(12.2) | 76<br>(24.4) | ……<br>…… |
| 27.79<br>(20.72) | 2194 | 2.466<br>(9.335) | 0.612<br>(0.372) | 11.27<br>(2.220) | 168<br>(75.6) | 53<br>(11.7) | 74<br>(23.6) | ……<br>…… |
| 62.51<br>(46.61) | 2101 | 4.202<br>(15.906) | 0.464<br>(0.282) | 14.88<br>(2.930) | 189<br>(87.2) | 54<br>(11.9) | 76<br>(24.2) | ……<br>…… |
| 13.98<br>(10.42) | 2208 | 1.883<br>(7.128) | 0.929<br>(0.565) | 7.42<br>(1.462) | 168<br>(75.8) | 53<br>(11.7) | 74<br>(23.3) | ……<br>…… |
| 41.41<br>(30.88) | 2178 | 3.023<br>(11.443) | 0.503<br>(0.306) | 13.70<br>(2.699) | 170<br>(76.7) | 53<br>(11.7) | 75<br>(23.9) | ……<br>…… |
| Av 33.43<br>Av (24.93) | 2179 | 2.761<br>(10.452) | 0.570<br>(0.346) | 12.11<br>(2.385) | 175<br>(79.3) | 53<br>(11.8) | 75<br>(23.9) | 29.247<br>(98.762) |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 52.98<br>(39.51) | 3029<br>(13.47) | 6.56<br>(10.56) | 2097 | 4.07 | 4.096<br>(15.505) | 0.533<br>(0.324) | 12.93<br>(2.548) | 178<br>(81.1) | 53<br>(11.7) | 61<br>(16.1) | 29.170<br>(98.503) |
| **75% of Pull at Maximum Power—Ten Hours 11th (6L) Gear** | | | | | | | | | | | |
| 42.16<br>(31.44) | 2297<br>(10.22) | 6.88<br>(11.08) | 2174 | 2.89 | 3.505<br>(13.268) | 0.573<br>(0.349) | 12.03<br>(2.370) | 177<br>(80.6) | 65<br>(18.3) | 73<br>(22.7) | 28.880<br>(97.523) |
| **50% of Pull at Maximum Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 28.70<br>(21.40) | 1533<br>(6.82) | 7.02<br>(11.30) | 2195 | 1.94 | 2.845<br>(10.771) | 0.684<br>(0.416) | 10.09<br>(1.987) | 170<br>(76.7) | 66<br>(18.6) | 74<br>(23.1) | 28.715<br>(96.966) |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 28.73<br>(21.42) | 1533<br>(6.82) | 7.03<br>(11.31) | 1500 | 1.79 | 2.338<br>(8.850) | 0.561<br>(0.341) | 12.29<br>(2.420) | 178<br>(80.8) | 68<br>(20.0) | 79<br>(26.1) | 28.720<br>(96.983) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 44.37<br>(33.09) | 7578<br>(33.71) | 2.20<br>(3.53) | 2133 | 13.35 | 4th (2H) Gear | | | 177<br>(80.6) | 62<br>(16.7) | 67<br>(19.4) | 28.710<br>(96.949) |
| 48.69<br>(36.31) | 7411<br>(32.96) | 2.46<br>(3.97) | 2098 | 13.06 | 5th (3L) Gear | | | 185<br>(84.7) | 64<br>(17.8) | 70<br>(21.1) | 28.700<br>(96.916) |
| 50.23<br>(37.46) | 5641<br>(25.09) | 3.34<br>(5.37) | 2099 | 8.39 | 6th (3H) Gear | | | 184<br>(84.2) | 55<br>(12.8) | 65<br>(18.3) | 29.120<br>(98.334) |
| 51.88<br>(38.69) | 5081<br>(22.60) | 3.83<br>(6.16) | 2101 | 7.20 | 7th (4L) Gear | | | 181<br>(82.5) | 55<br>(12.8) | 65<br>(18.3) | 29.120<br>(98.334) |
| 53.02<br>(39.54) | 4500<br>(20.01) | 4.42<br>(7.11) | 2101 | 6.18 | 8th (5L) Gear | | | 181<br>(82.8) | 55<br>(12.8) | 65<br>(18.3) | 29.120<br>(98.334) |
| 50.97<br>(38.01) | 3796<br>(16.88) | 5.04<br>(8.10) | 2099 | 5.07 | 9th (4H) Gear | | | 180<br>(81.9) | 55<br>(12.8) | 65<br>(18.3) | 29.130<br>(98.368) |
| 52.19<br>(38.92) | 3376<br>(15.01) | 5.80<br>(9.33) | 2103 | 4.36 | 10th (5H) Gear | | | 181<br>(82.8) | 55<br>(12.8) | 65<br>(18.3) | 29.130<br>(98.368) |
| 53.70<br>(40.05) | 3063<br>(13.62) | 6.57<br>(10.58) | 2100 | 4.00 | 11th (6L) Gear | | | 182<br>(83.3) | 54<br>(12.2) | 64<br>(17.8) | 29.140<br>(98.401) |
| 51.05<br>(38.07) | 2236<br>(9.94) | 8.56<br>(13.78) | 2101 | 2.76 | 12th (6H) Gear | | | 180<br>(82.2) | 53<br>(11.7) | 65<br>(18.3) | 29.130<br>(98.368) |

**Department of Agricultural Engineering**

**Dates of Test:** April 5 to May 6, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.790 gal *(6.778 l)* **Drained from motor** 1.525 gal *(5.772 l)* **Transmission and hydraulic lubricant** Ford 134 fluid **Total time engine was operated** 52.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** four cylinder vertical **Serial No.** *L634940* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.2" *(112 mm × 107 mm)* **Compression ratio** 16.3 to 1 **Displacement** 256 cu in *(4195 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow paper cartridge **Oil cooler** radiator for transmission and hydraulic oil, radiator for power steering fluid **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** C680988 **Tread width** rear 60" *(1525 mm)* to 80" *(2032 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 87.5" *(2223 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 29.3" *(744 mm)* Vertical distance above roadway 32.9" *(837 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.3 *(2.2)* second 1.7 *(2.8)* third 2.0 *(3.1)* fourth 2.5 *(4.0)* fifth 2.9 *(4.6)* sixth 3.7 *(5.9)* seventh 4.2 *(6.7)* eighth 4.8 *(7.7)* ninth 5.4 *(8.7)* tenth 6.1 *(9.9)* eleventh 6.9 *(11.2)* twelfth 8.9 *(14.4)* thirteenth 10.2 *(16.3)* fourteenth 13.1 *(21.0)* fifteenth 14.8 *(23.7)* sixteenth 19.0 *(30.6)* reverse 1.7 *(2.8)*, 2.2 *(3.6)*, 2.5 *(4.1)*, 3.3 *(5.3)*, 3.7 *(6.0)*, 4.8 *(7.7)*, 5.4 *(8.7)*, 6.9 *(11.2)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 120" *(3.05 m)* left 120" *(3.05 m)* (on concrete surface without brake) right 138" *(3.51 m)* left 138" *(3.51 m)* **Turning space diameter** (on concrete surface with brake applied) right 249" *(6.32 m)* left 249" *(6.32 m)* (on concrete surface without brake) right 294" *(7.47 m)* left 294" *(7.47 m)* **Power take-off** 540 rpm at 1901 engine rpm.

### LUGGING ABILITY IN 11th (6L) GEAR

| Crankshaft Speed rpm | 2100 | 1893 | 1683 | 1479 | 1263 | 1061 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 3063<br>(13.62) | 3256<br>(14.48) | 3419<br>(15.21) | 3516<br>(15.64) | 3551<br>(15.79) | 3469<br>(15.43) |
| Increase in Pull % | 0 | 6 | 12 | 15 | 15 | 13 |
| Power—Hp<br>(kW) | 53.70<br>(40.05) | 51.31<br>(38.26) | 47.81<br>(35.65) | 43.08<br>(32.12) | 36.94<br>(27.54) | 30.54<br>(22.77) |
| Speed—Mph<br>(km/h) | 6.57<br>(10.58) | 5.91<br>(9.51) | 5.24<br>(8.44) | 4.59<br>(7.39) | 3.92<br>(6.31) | 3.30<br>(5.31) |
| Slip % | 4.00 | 4.29 | 4.57 | 4.71 | 4.71 | 4.57 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 96.5 |
| 75% of Pull at Maximum Power—Ten Hours | 95.5 |
| 50% of Pull at Maximum Power—Two Hours | 94.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 92.0 |
| Bystander in 15th (8L) gear | 89.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 1112 lb *(505 kg)* | None |
| | —Cast Iron (each) | 400 lb *(181 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 52 lb *(24 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator—Rear | | 7325 lb *(3323 kg)* | 4300 lb *(1951 kg)* |
| —Front | | 2220 lb *(1007 kg)* | 2115 lb *(959 kg)* |
| —Total | | 9545 lb *(4330 kg)* | 6415 lb *(2910 kg)* |

Ford 5610 (16 X 8) Diesel

**REPAIRS AND ADJUSTMENTS:** The fuel injection pump was replaced during preliminary PTO tests.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 148°F *(64.4°C)*. Nine gears were chosen between stability limit and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.37 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1429**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Kleis, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1430 — FORD 6610 (16 X 4) DIESEL
# ALSO FORD 6710 (16 X 4) DIESEL
# 16 SPEED ALSO 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—596 rpm)** | | | | | | | | |
| 72.13 | 2100 | 4.592 | 0.449 | 15.37 | [illegible] | 55 | 75 | [illegible] |
| (53.79) | | (17.761) | (0.273) | (3.029) | (90.8) | (12.9) | (23.9) | [illegible] |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 68.27 | 1901 | 4.566 | 0.441 | 15.64 | 197 | 54 | 75 | 28.860 |
| (50.91) | | (16.327) | (0.268) | (3.080) | (91.9) | (12.4) | (23.9) | (97.456) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 63.35 | 2170 | 4.071 | 0.443 | 15.56 | 183 | 54 | 74 | ...... |
| (47.24) | | (15.410) | (0.270) | (3.066) | (83.9) | (12.3) | (23.6) | ...... |
| 0.00 | 2252 | 1.240 | ..... | ..... | 166 | 54 | 74 | ...... |
| (0.00) | | (4.694) | ..... | ..... | (74.7) | (12.2) | (23.3) | ...... |
| 32.38 | 2218 | 2.545 | 0.542 | 12.73 | 170 | 54 | 74 | ...... |
| (24.15) | | (9.634) | (0.330) | (2.507) | (76.9) | (12.2) | (23.3) | ...... |
| 72.46 | 2102 | 4.732 | 0.450 | 15.31 | 189 | 54 | 74 | ...... |
| (54.03) | | (17.913) | (0.274) | (3.016) | (87.2) | (12.2) | (23.6) | ...... |
| 16.35 | 2240 | 1.862 | 0.786 | 8.78 | 168 | 54 | 75 | ...... |
| (12.19) | | (7.048) | (0.478) | (1.730) | (75.8) | (12.2) | (23.9) | ...... |
| 48.17 | 2190 | 3.262 | 0.467 | 14.77 | 173 | 54 | 75 | ...... |
| (35.92) | | (12.348) | (0.284) | (2.909) | (78.3) | (12.5) | (23.9) | ...... |
| **Av** 38.78 | 2197 | 2.952 | 0.525 | 13.14 | 175 | 54 | 75 | 28.903 |
| *Av* (28.92) | | (11.175) | (0.319) | (2.588) | (79.3) | (12.3) | (23.6) | (97.600) |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 60.96 | 4066 | 5.62 | 2100 | 6.22 | 4.549 | 0.515 | 13.40 | 176 | 47 | 61 | 29.110 |
| (45.46) | (18.08) | (9.05) | | | (17.220) | (0.313) | (2.640) | (79.7) | (8.3) | (15.8) | (98.300) |
| **75% of Pull at Maximum Power—Ten Hours 10th (6L) Gear** | | | | | | | | | | | |
| 48.72 | 3063 | 5.96 | 2188 | 4.52 | 3.778 | 0.535 | 12.90 | 171 | 46 | 54 | 28.838 |
| (36.33) | (13.63) | (9.60) | | | (14.300) | (0.325) | (2.541) | (76.9) | (7.8) | (12.2) | (97.383) |
| **50% of Pull at Maximum Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 32.78 | 2001 | 6.14 | 2228 | 3.44 | 3.045 | 0.641 | 10.77 | 169 | 47 | 48 | 28.685 |
| (24.45) | (8.90) | (9.89) | | | (11.526) | (0.390) | (2.121) | (76.1) | (8.1) | (8.9) | (96.865) |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 32.66 | 2000 | 6.12 | 1266 | 3.44 | 2.682 | 0.566 | 12.18 | 170 | 45 | 47 | 28.735 |
| (24.36) | (8.90) | (9.86) | | | (10.154) | (0.345) | (2.399) | (76.4) | (6.9) | (8.1) | (97.034) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 54.34 | 7887 | 2.58 | 2161 | 14.61 | 5th (3L) Gear | | | 171 | 35 | 40 | 29.170 |
| (40.52) | (35.08) | (4.16) | | | | | | (77.2) | (1.7) | (4.4) | (98.503) |
| 57.58 | 6388 | 3.38 | 2100 | 10.66 | 6th (3H) Gear | | | 177 | 47 | 59 | 29.140 |
| (42.94) | (28.42) | (5.44) | | | | | | (80.6) | (8.3) | (15.0) | (98.401) |
| 59.84 | 6242 | 3.60 | 2097 | 10.15 | 7th (4L) Gear | | | 176 | 47 | 59 | 29.140 |
| (44.63) | (27.76) | (5.79) | | | | | | (80.0) | (8.3) | (15.0) | (98.401) |
| 61.06 | 5189 | 4.41 | 2097 | 7.94 | 8th (5L) Gear | | | 177 | 47 | 58 | 29.160 |
| (45.53) | (23.08) | (7.10) | | | | | | (80.3) | (8.3) | (14.4) | (98.469) |
| 59.37 | 4653 | 4.79 | 2098 | 7.00 | 9th (4H) Gear | | | 177 | 47 | 57 | 29.170 |
| (44.27) | (20.70) | (7.70) | | | | | | (80.3) | (8.3) | (13.9) | (98.503) |
| 61.17 | 4084 | 5.62 | 2098 | 6.04 | 10th (6L) Gear | | | 177 | 47 | 61 | 29.100 |
| (45.62) | (18.16) | (9.04) | | | | | | (80.3) | (8.3) | (16.1) | (98.266) |
| 60.49 | 3901 | 5.82 | 2100 | 5.84 | 11th (5H) Gear | | | 175 | 46 | 56 | 29.190 |
| (45.11) | (17.35) | (9.36) | | | | | | (79.4) | (7.8) | (13.3) | (98.570) |
| 59.72 | 3048 | 7.35 | 2096 | 4.49 | 12th (6H) Gear | | | 175 | 47 | 57 | 29.180 |
| (44.53) | (13.56) | (11.83) | | | | | | (79.4) | (8.3) | (13.9) | (98.536) |

**Department of Agricultural Engineering**

**Dates of Test:** April 1 to April 21, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil** SAE 30 **API service classification** SE/SF-CC/CD **To motor** 1.910 gal *(7.232 l)* **Drained from motor** 1.632 gal *(6.179 l)* **Transmission and final drive lubricant** Ford 134 fluid **Front axle lubricant** Ford EOAZ-19580 fluid **Total time engine was operated** 52.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** four cylinder vertical **Serial No.** *E635576* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 16.3 to 1 **Displacement** 268 cu in *(4392 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil, radiator for power steering fluid **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** *C681211* **Tread width** rear 60" *(1525 mm)* to 90" *(2285 mm)* front 60" *(1525 mm)* to 80" *(2032 mm)* **Wheel base** 88.8" *(2256 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.6" *(803 mm)* Vertical distance above roadway 32.9" *(837 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 1.3 *(2.2)* second 1.7 *(2.7)* third 1.7 *(2.8)* fourth 2.2 *(3.5)* fifth 2.9 *(4.7)* sixth 3.8 *(6.1)* seventh 4.0 *(6.5)* eighth 4.8 *(7.8)* ninth 5.2 *(8.4)* tenth 6.0 *(9.7)* eleventh 6.2 *(10.0)* twelfth 7.8 *(12.5)* thirteenth 10.6 *(17.0)* fourteenth 13.6 *(21.8)* fifteenth 14.5 *(23.4)* sixteenth 18.6 *(30.0)* reverse 1.9 *(3.1)*, 2.5 *(4.0)*, 7.0 *(11.2)*, 8.9 *(14.4)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 194" *(4.93 m)* left 194" *(4.93 m)* (on concrete surface without brake) right 209" *(5.30 m)* left 209" *(5.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 395" *(10.03 m)* left 395" *(10.03 m)* (on concrete surface without brake) right 425" *(10.79 m)* left 425" *(10.79 m)* **Power take-off** 540 rpm at 1901 engine rpm.

## LUGGING ABILITY IN 10th (6L) GEAR

| Crankshaft Speed rpm | 2098 | 1891 | 1676 | 1475 | 1274 | 1050 |
|---|---|---|---|---|---|---|
| Pull—lbs | 4084 | 4332 | 4507 | 4575 | 4542 | 4298 |
| (kN) | (18.16) | (19.27) | (20.05) | (20.35) | (20.20) | (19.12) |
| Increase in Pull % | 0 | 6 | 10 | 12 | 11 | 5 |
| Power—Hp | 61.17 | 58.31 | 53.62 | 47.81 | 40.99 | 32.08 |
| (kW) | (45.62) | (43.48) | (39.99) | (35.65) | (30.56) | (23.92) |
| Speed—Mph | 5.62 | 5.05 | 4.46 | 3.92 | 3.38 | 2.80 |
| (km/h) | (9.04) | (8.12) | (7.18) | (6.31) | (5.45) | (4.50) |
| Slip % | 6.04 | 6.46 | 6.59 | 6.73 | 6.87 | 6.59 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 97.0 | 96.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 96.5 |
| 50% of Pull at Maximum Power—Two Hours | | 96.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 93.0 |
| Bystander in 16th (8H) gear | | 88.5 |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 60.88 | 3986 | 5.73 | 2100 | 5.06 | 4.477 | 0.507 | 13.60 | 175 | 47 | 62 | 29.075 |
| (45.40) | (17.73) | (9.22) | | | (16.946) | (0.308) | (2.679) | (79.2) | (8.1) | (16.4) | (98.182) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 44.47 | 8708 | 1.91 | 2178 | 14.92 | 4th (2H) Gear | | | 165 | 36 | 42 | 29.170 |
| (33.16) | (38.73) | (3.08) | | | | | | (73.8) | (2.2) | (5.6) | (98.503) |
| 62.15 | 5176 | 4.50 | 2101 | 6.98 | 8th (5L) Gear | | | 174 | 47 | 58 | 29.150 |
| (46.35) | (23.02) | (7.25) | | | | | | (78.9) | (8.3) | (14.4) | (98.435) |
| 61.43 | 4024 | 5.72 | 2101 | 5.24 | 10th (6L) Gear | | | 174 | 45 | 55 | 29.200 |
| (45.81) | (17.90) | (9.21) | | | | | | (78.9) | (7.2) | (12.8) | (98.604) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 18.4-34; 6; 16 (110) | Two 18.4-34; 6; 16 (110) |
| Ballast | —Liquid ([illegible]) | 730 lb (331 kg) | None |
| | —Cast Ir[illegible]ch) | 340 lb (154 kg) | None |
| Front Tires | —No., size, [illegible] & psi (kPa) | Two 13.6-24; 8; 22 (150) | Two 13.6-24; 8; 22 (150) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 65 lb (29 kg) | None |
| Height of Drawbar | | 20 in (510 mm) | 20 in (510 mm) |
| Static Weight with Operator | —Rear | 6925 lb (3141 kg) | 4785 lb (2170 kg) |
| | —Front | 2775 lb (1259 kg) | 2645 lb (1200 kg) |
| | —Total | 9700 lb (4400 kg) | 7430 lb (3370 kg) |

**Ford 6610 (16 X 4) Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

**REPAIRS and ADJUSTMENTS:** The timing cover gasket was replaced during preliminary PTO tests.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 160°F *(71.1°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.54 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1430.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

# NEBRASKA TRACTOR TEST 1431 — FORD 6610 (16 X 8) DIESEL
# ALSO FORD 6710 (16 X 8) DIESEL
# 16 SPEED ALSO 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—596 rpm)** | | | | | | | | |
| 72.30<br>(53.91) | 2099 | 4.773<br>(18.068) | 0.455<br>(0.277) | 15.15<br>(2.984) | 207<br>(97.2) | 56<br>(13.3) | 75<br>(23.8) | 28.857<br>(97.445) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 69.20<br>(51.60) | 1900 | 4.485<br>(16.978) | 0.447<br>(0.272) | 15.43<br>(3.039) | 211<br>(99.7) | 55<br>(12.9) | 75<br>(23.9) | 28.860<br>(97.456) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 63.88<br>(47.64) | 2182 | 4.145<br>(15.691) | 0.448<br>(0.272) | 15.41<br>(3.036) | 194<br>(90.3) | 55<br>(12.8) | 76<br>(24.2) | ......<br>...... |
| 0.00<br>(0.00) | 2268 | 1.288<br>(4.876) | .....<br>..... | .....<br>..... | 152<br>(66.4) | 54<br>(12.3) | 75<br>(23.9) | ......<br>...... |
| 32.78<br>(24.44) | 2240 | 2.653<br>(10.043) | 0.558<br>(0.340) | 12.35<br>(2.434) | 164<br>(73.3) | 54<br>(11.9) | 74<br>(23.6) | ......<br>...... |
| 73.44<br>(54.76) | 2100 | 4.854<br>(18.374) | 0.456<br>(0.277) | 15.13<br>(2.980) | 202<br>(94.2) | 53<br>(11.7) | 75<br>(23.9) | ......<br>...... |
| 16.52<br>(12.32) | 2255 | 1.931<br>(7.310) | 0.806<br>(0.491) | 8.55<br>(1.685) | 158<br>(70.3) | 53<br>(11.7) | 74<br>(23.1) | ......<br>...... |
| 48.48<br>(36.15) | 2200 | 3.341<br>(12.647) | 0.475<br>(0.289) | 14.51<br>(2.858) | 176<br>(80.0) | 53<br>(11.7) | 76<br>(24.2) | ......<br>...... |
| Av 39.18<br>Av (29.22) | 2209 | 3.035<br>(11.489) | 0.534<br>(0.325) | 12.91<br>(2.543) | 174<br>(79.1) | 54<br>(12.2) | 75<br>(23.9) | 28.845<br>(97.405) |

## DRAWBAR PERFORMANCE WITH BIAS PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 61.37<br>(45.77) | 3544<br>(15.76) | 6.49<br>(10.45) | 2098 | 5.06 | 4.658<br>(17.632) | 0.523<br>(0.318) | 15.18<br>(2.996) | 196<br>(90.8) | 53<br>(11.7) | 70<br>(21.1) | 29.000<br>(97.939) |
| **75% of Pull at Maximum Power—Ten Hours 11th (6L) Gear** | | | | | | | | | | | |
| 50.13<br>(37.39) | 2715<br>(12.08) | 6.92<br>(11.14) | 2203 | 3.60 | 3.904<br>(14.778) | 0.537<br>(0.327) | 12.84<br>(2.530) | 175<br>(79.7) | 53<br>(11.7) | 66<br>(18.9) | 28.788<br>(97.213) |
| **50% of Pull at Maximum Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 34.08<br>(25.42) | 1811<br>(8.05) | 7.06<br>(11.36) | 2224 | 2.65 | 3.135<br>(11.869) | 0.634<br>(0.386) | 10.87<br>(2.141) | 149<br>(64.7) | 44<br>(6.7) | 50<br>(9.7) | 29.065<br>(98.148) |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 34.19<br>(25.49) | 1811<br>(8.05) | 7.08<br>(11.40) | 1524 | 2.57 | 2.610<br>(9.879) | 0.527<br>(0.320) | 13.10<br>(2.580) | 168<br>(75.3) | 47<br>(8.[illegible]) | 57<br>(13.6) | 29.075<br>(98.182) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 52.61<br>(39.23) | 7948<br>(35.35) | 2.48<br>(3.99) | 2161 | 14.87 | 5th (3L) Gear | | | 163<br>(72.8) | 41<br>(5.0) | 45<br>(7.2) | 28.990<br>(97.895) |
| 56.89<br>(42.42) | 6608<br>(29.39) | 3.23<br>(5.20) | 2100 | 11.40 | 6th (3H) Gear | | | 193<br>(89.4) | 53<br>(11.7) | 70<br>(21.1) | 29.040<br>(98.064) |
| 59.19<br>(44.13) | 5937<br>(26.41) | 3.74<br>(6.02) | 2100 | 9.33 | 7th (4L) Gear | | | 196<br>(91.1) | 53<br>(11.[illegible]) | 70<br>(21.1) | 29.050<br>(98.097) |
| 60.42<br>(45.06) | 5223<br>(23.23) | 4.34<br>(6.98) | 2098 | 7.76 | 8th (5L) Gear | | | 197<br>(91.4) | 53<br>(11.7) | 70<br>(21.1) | 29.060<br>(98.131) |
| 58.41<br>(43.56) | 4410<br>(19.61) | 4.97<br>(7.99) | 2100 | 6.35 | 9th (4H) Gear | | | 195<br>(90.6) | 52<br>(11.1) | 70<br>(21.1) | 29.070<br>(98.165) |
| 60.12<br>(44.83) | 3952<br>(17.58) | 5.70<br>(9.18) | 2099 | 5.73 | 10th (5H) Gear | | | 195<br>(90.3) | 50<br>(10.0) | 66<br>(18.9) | 29.140<br>(98.401) |
| 62.64<br>(46.71) | 3620<br>(16.10) | 6.49<br>(10.44) | 2097 | 5.10 | 11th (6L) Gear | | | 193<br>(89.2) | 52<br>(11.1) | 69<br>(20.6) | 29.100<br>(98.266) |
| 59.97<br>(44.72) | 2650<br>(11.79) | 8.49<br>(13.66) | 2100 | 3.60 | 12th (6H) Gear | | | 194<br>(89.7) | 52<br>(11.1) | 70<br>(21.1) | 29.080<br>(98.199) |

**Department of Agricultural Engineering**

**Dates of Test:** April 13 to May 4, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8283 **Fuel weight** 6.897 lbs/gal *(0.827 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.851 gal *(7.005 l)* **Drained from motor** 1.599 gal *(6.055 l)* **Transmission and final drive lubricant** Ford 134 fluid **Total time engine was operated** 58.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** four cylinder vertical **Serial No.** *E644056* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 16.3 to 1 **Displacement** 268 cu in *(4392 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for transmission and hydraulic oil, radiator for power steering fluid **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard **Serial No.** C680989 **Tread width** rear 60" *(1525 mm)* to 90" *(2285 mm)* front 52" *(1320 mm)* to 80" *(2032 mm)* **Wheel base** 87.5" *(2223 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 28.2" *(716 mm)* Vertical distance above roadway 32.9" *(837 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.3 *(2.2)* second 1.7 *(2.8)* third 2.0 *(3.1)* fourth 2.5 *(4.0)* fifth 2.9 *(4.6)* sixth 3.7 *(5.9)* seventh 4.2 *(6.7)* eighth 4.8 *(7.7)* ninth 5.4 *(8.7)* tenth 6.1 *(9.9)* eleventh 6.9 *(11.2)* twelfth 8.9 *(14.4)* thirteenth 10.2 *(16.3)* fourteenth 13.1 *(21.0)* fifteenth 14.8 *(23.7)* sixteenth 19.0 *(30.6)* reverse 1.7 *(2.8)*, 2.2 *(3.6)*, 2.5 *(4.1)*, 3.3 *(5.3)*, 3.7 *(6.0)*, 4.8 *(7.7)*, 5.4 *(8.7)*, 6.9 *(11.2)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 120" *(3.05 m)* left 120" *(3.05 m)* (on concrete surface without brake) right 138" *(3.51 m)* left 138" *(3.51 m)* **Turning space diameter** (on concrete surface with brake applied) right 249" *(6.32 m)* left 249" *(6.32 m)* (on concrete surface without brake) right 294" *(7.47 m)* left 294" *(7.47 m)* **Power take-off** 540 rpm at 1900 engine rpm.

### LUGGING ABILITY IN 11th (6L) GEAR

| Crankshaft Speed rpm | 2097 | 1891 | 1686 | 1474 | 1268 | 1054 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 3620<br>(16.10) | 3811<br>(16.95) | 3990<br>(17.75) | 4069<br>(18.10) | 3949<br>(17.57) | 3754<br>(16.70) |
| Increase in Pull % | 0 | 5 | 10 | 12 | 9 | 4 |
| Power—Hp<br>(kW) | 62.64<br>(46.71) | 59.27<br>(44.20) | 54.95<br>(40.98) | 49.08<br>(36.60) | 41.06<br>(30.62) | 32.48<br>(24.22) |
| Speed—Mph<br>(km/h) | 6.49<br>(10.44) | 5.83<br>(9.39) | 5.16<br>(8.31) | 4.52<br>(7.28) | 3.90<br>(6.28) | 3.24<br>(5.22) |
| Slip % | 5.10 | 5.38 | 5.66 | 5.80 | 5.66 | 5.52 |

| TRACTOR SOUND LEVEL WITHOUT CAB | Radial dB(A) | Bias dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 95.5 | 96.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 95.5 |
| 50% of Pull at Maximum Power—Two Hours | | 96.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 93.0 |
| Bystander in 15th (8L) gear | | 88.5 |

## DRAWBAR PERFORMANCE WITH RADIAL PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crankshaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 63.07<br>(47.04) | 3446<br>(15.33) | 6.86<br>(11.05) | 2098 | 2.55 | 4.640<br>(17.563) | 0.507<br>(0.309) | 13.59<br>(2.678) | 182<br>(83.3) | 52<br>(11.1) | 57<br>(13.6) | 29.140<br>(98.401) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 60.07<br>(44.80) | 8162<br>(36.30) | 2.76<br>(4.44) | 2164 | 8.16 | 5th (3L) Gear | | | 182<br>(83.1) | 54<br>(12.2) | 61<br>(16.1) | 29.130<br>(98.368) |
| 61.14<br>(45.59) | 6431<br>(28.61) | 3.57<br>(5.74) | 2101 | 5.01 | 6th (3H) Gear | | | 187<br>(86.1) | 54<br>(12.2) | 61<br>(16.1) | 29.130<br>(98.368) |
| 62.49<br>(46.60) | 5760<br>(25.66) | 4.06<br>(6.54) | 2100 | 4.35 | 7th (4L) Gear | | | 185<br>(84.7) | 54<br>(12.2) | 60<br>(15.6) | 29.130<br>(98.368) |
| 63.27<br>(47.18) | 5086<br>(22.62) | 4.66<br>(7.51) | 2100 | 3.76 | 8th (5L) Gear | | | 187<br>(86.1) | 54<br>(12.2) | 60<br>(15.6) | 29.130<br>(98.368) |
| 60.80<br>(45.34) | 4310<br>(19.17) | 5.29<br>(8.51) | 2100 | 3.08 | 9th (4H) Gear | | | 185<br>(85.0) | 54<br>(12.2) | 59<br>(15.0) | 29.140<br>(98.401) |
| 61.58<br>(45.92) | 3805<br>(16.92) | 6.07<br>(9.77) | 2103 | 2.78 | 10th (5H) Gear | | | 184<br>(84.4) | 54<br>(12.2) | 59<br>(15.0) | 29.140<br>(98.401) |
| 63.67<br>(47.48) | 3475<br>(15.46) | 6.87<br>(11.06) | 2100 | 2.55 | 11th (6L) Gear | | | 184<br>(84.4) | 53<br>(11.7) | 58<br>(14.4) | 29.140<br>(98.401) |
| 60.65<br>(45.23) | 2563<br>(11.40) | 8.87<br>(14.28) | 2097 | 2.02 | 12th (6H) Gear | | | 183<br>(83.9) | 54<br>(12.2) | 59<br>(15.0) | 29.140<br>(98.401) |

### LUGGING ABILITY IN 11th (6L) GEAR

| Crankshaft Speed rpm | 2100 | 1902 | 1683 | 1478 | 1260 | 1057 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 3475<br>(15.46) | 3731<br>(16.60) | 3903<br>(17.36) | 3981<br>(17.71) | 3889<br>(17.30) | 3714<br>(16.52) |
| Increase in Pull % | 0 | 7 | 12 | 15 | 12 | 7 |
| Power—Hp<br>(kW) | 63.67<br>(47.48) | 61.83<br>(46.11) | 57.16<br>(42.63) | 51.16<br>(38.15) | 42.60<br>(31.77) | 34.18<br>(25.49) |
| Speed—Mph<br>(km/h) | 6.87<br>(11.06) | 6.21<br>(10.00) | 5.49<br>(8.84) | 4.82<br>(7.75) | 4.11<br>(6.61) | 3.45<br>(5.55) |
| Slip % | 2.55 | 2.65 | 2.78 | 2.93 | 2.78 | 2.78 |

**REPAIRS and ADJUSTMENTS:** During the lugging test the throttle linkage clip became disconnected. Test continued after the clip was reconnected.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 162°F *(72.2°C)*. Eight gears were chosen between 15% slip (bias ply tires), stability limit with radial ply tires and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.54 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1431.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**Ford 6610 (16 X 8) Diesel**

| TIRES, BALLAST AND WEIGHT | | Bias Ply Tires: With Ballast | Bias Ply Tires: Without Ballast | Radial Ply Tires: With Ballast | Radial Ply Tires: Without Ballast |
|---|---|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4R34; 6; 16 *(110)* | Two 18.4R34; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 950 lb *(431 kg)* | None | 950 lb *(431 kg)* | None |
| | —Cast Iron (each) | 340 lb *(154 kg)* | None | 278 lb *(126 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* |
| Ballast | —Liquid (each) | None | None | None | None |
| | —Cast Iron (each) | 135 lb *(61 kg)* | None | 135 lb *(61 kg)* | None |
| Height of Drawbar | | 21 in *(535 mm)* | 21 in *(535 mm)* | 21 in *(535 mm)* | 21 in *(535 mm)* |
| Static Weight with Operator | —Rear | 7250 lb *(3289 kg)* | 4670 lb *(2118 kg)* | 7250 lb *(32[illegible] kg)* | 4795 lb *(2175 kg)* |
| | —Front | 2450 lb *(1111 kg)* | 2180 lb *(989 kg)* | 2450 lb *(1111 kg)* | 2180 lb *(989 kg)* |
| | —Total | 9700 lb *(4400 kg)* | 6850 lb *(3107 kg)* | 9700 lb *(4400 kg)* | 6975 lb *(3164 kg)* |

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1432 — FORD 7610 (16 X 4) DIESEL
# ALSO FORD 7710 (16 X 4) DIESEL
# 16 SPEED ALSO 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| | Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1025 rpm)** | | | | | | | | | |
| | 86.95<br>*(64.84)* | 2100 | 5.595<br>*(21.170)* | 0.444<br>*(0.270)* | 15.54<br>*(3.062)* | 196<br>*(91.2)* | 55<br>*(12.6)* | 75<br>*(24.0)* | 29.170<br>*(98.503)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | | |
| | 86.79<br>*(64.72)* | 2048 | 5.510<br>*(20.858)* | 0.438<br>*(0.266)* | 15.75<br>*(3.103)* | 197<br>*(91.9)* | 55<br>*(12.7)* | 75<br>*(24.1)* | 29.110<br>*(98.300)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | | |
| | 78.26<br>*(58.36)* | 2224 | 5.307<br>*(20.089)* | 0.468<br>*(0.285)* | 14.75<br>*(2.905)* | 190<br>*(87.8)* | 55<br>*(12.8)* | 75<br>*(23.9)* | ......<br>...... |
| | 0.00<br>*(0.00)* | 2262 | 1.636<br>*(6.193)* | ......<br>...... | ......<br>...... | 169<br>*(76.1)* | 54<br>*(12.3)* | 74<br>*(23.6)* | ......<br>...... |
| | 39.60<br>*(29.53)* | 2251 | 3.428<br>*(12.976)* | 0.597<br>*(0.363)* | 11.55<br>*(2.276)* | 172<br>*(78.1)* | 54<br>*(12.2)* | 75<br>*(23.9)* | ......<br>...... |
| | 87.81<br>*(65.48)* | 2099 | 5.660<br>*(21.425)* | 0.444<br>*(0.270)* | 15.51<br>*(3.056)* | 194<br>*(89.7)* | 54<br>*(12.2)* | 75<br>*(23.9)* | ......<br>...... |
| | 20.00<br>*(14.91)* | 2271 | 2.528<br>*(9.570)* | 0.872<br>*(0.530)* | 7.91<br>*(1.558)* | 171<br>*(77.2)* | 55<br>*(12.8)* | 76<br>*(24.2)* | ......<br>...... |
| | 59.94<br>*(44.03)* | 2236 | 4.329<br>*(16.387)* | 0.506<br>*(0.308)* | 13.64<br>*(2.687)* | 177<br>*(80.6)* | 55<br>*(12.8)* | 76<br>*(24.4)* | ......<br>...... |
| Av<br>*Av.* | 47.45<br>*(35.38)* | 2227 | 3.815<br>*(14.442)* | 0.554<br>*(0.337)* | 12.44<br>*(2.450)* | 179<br>*(81.6)* | 55<br>*(12.6)* | 75<br>*(24.0)* | 29.000<br>*(98.199)* |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 74.08<br>*(55.24)* | 5027<br>*(22.36)* | 5.53<br>*(8.89)* | 2100 | 6.78 | 5.547<br>*(20.997)* | 0.516<br>*(0.314)* | 13.36<br>*(2.631)* | 187<br>*(85.8)* | 57<br>*(13.6)* | 71<br>*(21.7)* | 28.775<br>*(97.169)* |
| **75% of Pull at Maximum Power—Ten Hours 10th (6L) Gear** | | | | | | | | | | | |
| 58.94<br>*(43.95)* | 3675<br>*(16.35)* | 6.01<br>*(9.68)* | 2244 | 5.06 | 4.796<br>*(18.156)* | 0.561<br>*(0.341)* | 12.29<br>*(2.421)* | 172<br>*(78.0)* | 47<br>*(8.2)* | 51<br>*(10.5)* | 28.863<br>*(97.466)* |
| **50% of Pull at Maximum Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 40.16<br>*(29.95)* | 2450<br>*(10.90)* | 6.15<br>*(9.89)* | 2263 | 3.82 | 3.879<br>*(14.684)* | 0.666<br>*(0.405)* | 10.35<br>*(2.039)* | 171<br>*(77.2)* | 47<br>*(8.3)* | 49<br>*(9.2)* | 28.845<br>*(97.405)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 40.25<br>*([illegible])* | 2450<br>*(10.90)* | 6.16<br>*(9.92)* | 1298 | 3.08 | 3.063<br>*(11.596)* | 0.525<br>*(0.319)* | 13.14<br>*(2.588)* | 169<br>*(76.1)* | 47<br>*(8.3)* | 49<br>*(9.4)* | 28.840<br>*(97.388)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 60.91<br>*(45.42)* | 8804<br>*(39.16)* | 2.59<br>*(4.18)* | 2221 | 14.85 | 5th (3L) Gear | | | 173<br>*(78.3)* | 44<br>*(6.7)* | 46<br>*(7.8)* | 28.810<br>*(97.287)* |
| 68.16<br>*(50.83)* | 7820<br>*(34.79)* | 3.27<br>*(5.26)* | 2101 | 11.76 | 6th (3H) Gear | | | 175<br>*(79.2)* | 46<br>*(7.8)* | 50<br>*(10.0)* | 28.800<br>*(97.253)* |
| 70.35<br>*(52.61)* | 7564<br>*(33.65)* | 3.50<br>*(5.63)* | 2100 | 11.70 | 7th (4L) Gear | | | 186<br>*(85.6)* | 56<br>*(13.3)* | 68<br>*(20.0)* | 28.780<br>*(97.186)* |
| 73.44<br>*(54.77)* | 6361<br>*(28.30)* | 4.33<br>*(6.97)* | 2101 | 8.82 | 8th (5L) Gear | | | 184<br>*(84.4)* | 55<br>*(12.8)* | 67<br>*(19.4)* | 28.780<br>*(97.186)* |
| 72.03<br>*(53.71)* | 5743<br>*(25.54)* | 4.70<br>*(7.57)* | 2101 | 7.78 | 9th (4H) Gear | | | 183<br>*(83.6)* | 55<br>*(12.8)* | 66<br>*(18.9)* | 28.780<br>*(97.186)* |
| 74.22<br>*(55.35)* | 5034<br>*(22.39)* | 5.53<br>*(8.90)* | 2101 | 6.71 | 10th (6L) Gear | | | 178<br>*(80.8)* | 51<br>*(10.6)* | 58<br>*(14.4)* | 28.790<br>*(97.220)* |
| 73.84<br>*(55.07)* | 4851<br>*(21.58)* | 5.71<br>*(9.19)* | 2098 | 6.44 | 11th (5H) Gear | | | 180<br>*(81.9)* | 53<br>*(11.7)* | 62<br>*(16.7)* | 28.790<br>*(97.220)* |
| 74.16<br>*(55.30)* | 3839<br>*(17.07)* | 7.25<br>*(11.66)* | 2101 | 4.92 | 12th (6H) Gear | | | 179<br>*(81.7)* | 54<br>*(12.2)* | 64<br>*(17.8)* | 28.790<br>*(97.220)* |
| 71.61<br>*(53.40)* | 2690<br>*(11.96)* | 9.98<br>*(16.07)* | 2098 | 3.57 | 13th (7L) Gear | | | 180<br>*(81.9)* | 54<br>*(12.2)* | 65<br>*(18.3)* | 28.750<br>*(97.084)* |

**Department of Agricultural Engineering**

**Dates of Test:** April 14 to May 10, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8282 **Fuel weight** 6.896 lbs/gal *(0.826 kg/l)* **Oil SAE 30** **API service classification** SE/SF-CC/CD **To motor** 1.680 gal *(6.359 l)* **Drained from motor** 1.575 gal *(5.954 l)* **Transmission and hydraulic lubricant** Ford 134 fluid **Front axle lubricant** Ford EOAZ-19580 fluid **Total time engine was operated** 50.5 hours.

**ENGINE:** **Make** Ford Diesel **Type** four cylinder vertical with turbocharger **Serial No.** *F635687* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 15.6 to 1 **Displacement** 268 cu in *(4392 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil, radiator for power steering fluid **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** *C681345* **Tread width** rear 60" *(1525 mm)* to 90" *(2286 mm)* front 60" *(1525 mm)* to 80" *(2032 mm)* **Wheel base** 88.8" *(2255 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.4" *(798 mm)* Vertical distance above roadway 39.9" *(1013 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.3 *(2.2)* second 1.7 *(2.7)* third 1.7 *(2.8)* fourth 2.2 *(3.5)* fifth 2.9 *(4.7)* sixth 3.8 *(6.1)* seventh 4.0 *(6.5)* eighth 4.8 *(7.8)* ninth 5.2 *(8.4)* tenth 6.0 *(9.7)* eleventh 6.2 *(10.0)* twelfth 7.8 *(12.5)* thirteenth 10.6 *(17.0)* fourteenth 13.6 *(21.8)* fifteenth 14.5 *(23.4)* sixteenth 18.6 *(30.0)* reverse 1.9 *(3.1)*, 2.5 *(4.0)*, 7.0 *(11.2)*, 8.9 *(14.4)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 194" *(4.93 m)* left 194" *(4.93 m)* (on concrete surface without brake) right 209" *(5.30 m)* left 209" *(5.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 395" *(10.03 m)* left 395" *(10.03 m)* (on concrete surface without brake) right 425" *(10.79 m)* left 425" *(10.79 m)* **Power take-off** 540 rpm at 1900 engine rpm and 1000 rpm at 2048 engine rpm.

## LUGGING ABILITY IN 10th (6L) GEAR

| Crankshaft Speed rpm | 2101 | 1898 | 1679 | 1484 | 1266 | 1056 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 5034<br>*(22.39)* | 5457<br>*(24.27)* | 5740<br>*(25.53)* | 5849<br>*(26.02)* | 5360<br>*(23.84)* | 4838<br>*(21.52)* |
| Increase in Pull % | 0 | 8 | 14 | 16 | 6 | -4 |
| Power—Hp<br>*(kW)* | 74.22<br>*(55.35)* | 72.20<br>*(53.84)* | 66.85<br>*(49.85)* | 60.10<br>*(44.82)* | 47.33<br>*(35.29)* | 36.09<br>*(26.91)* |
| Speed—Mph<br>*(km/h)* | 5.53<br>*(8.90)* | 4.96<br>*(7.98)* | 4.37<br>*(7.03)* | 3.85<br>*(6.20)* | 3.31<br>*(5.33)* | 2.80<br>*(4.50)* |
| Slip % | 6.71 | 7.45 | 7.71 | 7.98 | 7.18 | 6.10 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 84.5 | 83.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 85.0 |
| 50% of Pull at Maximum Power—Two Hours | | 83.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 80.0 |
| Bystander in 16th (8H) gear | | 85.5 |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (6L) Gear** | | | | | | | | | | | |
| 74.91<br>*(55.86)* | 4987<br>*(22.18)* | 5.63<br>*(9.06)* | 2099 | 5.78 | 5.547<br>*(20.997)* | 0.511<br>*(0.311)* | 13.50<br>*(2.660)* | 190<br>*(87.5)* | 58<br>*(14.2)* | 74<br>*(23.1)* | 28.755<br>*(97.101)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 65.39<br>*(48.76)* | 9560<br>*(42.52)* | 2.56<br>*(4.13)* | 2178 | 14.94 | 5th (3L) Gear | | | 174<br>*(78.6)* | 45<br>*(7.2)* | 48<br>*(8.9)* | 28.810<br>*(97.287)* |
| 74.49<br>*(55.55)* | 6321<br>*(28.12)* | 4.42<br>*(7.11)* | 2100 | 7.75 | 8th (5L) Gear | | | 186<br>*(85.3)* | 55<br>*(12.8)* | 67<br>*(19.4)* | 28.780<br>*(97.186)* |
| 75.54<br>*(56.33)* | 5026<br>*(22.36)* | 5.64<br>*(9.07)* | 2100 | 5.78 | 10th (6L) Gear | | | 189<br>*(87.2)* | 57<br>*(13.9)* | 73<br>*(22.8)* | 28.750<br>*(97.084)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* |
| **Ballast** | —Liquid (each) | 898 lb *(407 kg)* | None |
| | —Cast Iron (each) | 150 lb *(68 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 13.6-24; 8; 22 *(150)* | Two 13.6-24; 8; 22 *(150)* |
| **Ballast** | —Liquid (each) | None | None |
| | —Cast Iron (each) | 62 lb *(28 kg)* | None |
| **Height of Drawbar** | | 20 in *(510 mm)* | 20 in *(510 mm)* |
| **Static Weight with Operator** | —Rear | 7700 lb *(34[illegible] kg)* | 5605 lb *(2542 kg)* |
| | —Front | 3100 lb *(1406 kg)* | 2975 lb *(1350 kg)* |
| | —Total | 10800 lb *(4899 kg)* | 8580 lb *(3892 kg)* |

**Ford 7610 (16 X 4) Diesel**

**REPAIRS and ADJUSTMENTS:** During preliminary PTO tests, all fuel injectors and both air filter elements were replaced.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 145°F *(62.8°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The radiator temperature indicator did not function during test. This tractor did not attain the estimated 15.90 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer. During inspection the exhaust valve stem of the No. 1 cylinder was found scored over a distance of about ¾ inch (20 mm).

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1432**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Klein, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1433 — FORD 7710 (16 X 8) DIESEL
# ALSO FORD 7610 (16 X 8) DIESEL
# 16 SPEED ALSO 8 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1086 rpm)** | | | | | | | | |
| 86.62<br>*(64.59)* | 2100 | 5.521<br>*(20.899)* | 0.440<br>*(0.267)* | 15.69<br>*(3.091)* | 194<br>*(90.0)* | 57<br>*(13.8)* | 75<br>*(23.7)* | 28.835<br>*(97.366)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 86.55<br>*(64.54)* | 2048 | 5.452<br>*(20.638)* | 0.434<br>*(0.264)* | 15.87<br>*(3.127)* | 194<br>*(89.8)* | 57<br>*(14.1)* | 75<br>*(23.8)* | 28.825<br>*(97.338)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 76.40<br>*(56.97)* | 2180 | 5.086<br>*(19.253)* | 0.459<br>*(0.279)* | 15.02<br>*(2.959)* | 188<br>*(86.9)* | 58<br>*(14.4)* | 74<br>*(23.6)* | ...... |
| 0.00<br>*(0.00)* | 2242 | 1.601<br>*(6.060)* | ..... | ..... | 169<br>*(76.1)* | 58<br>*(14.4)* | 75<br>*(23.9)* | ...... |
| 38.68<br>*(28.84)* | 2208 | 3.298<br>*(12.484)* | 0.588<br>*(0.358)* | 11.73<br>*(2.310)* | 172<br>*(77.8)* | 58<br>*(14.3)* | 75<br>*(23.9)* | ...... |
| 86.78<br>*(64.71)* | 2100 | 5.564<br>*(21.062)* | 0.442<br>*(0.269)* | 15.60<br>*(3.072)* | 191<br>*(88.3)* | 58<br>*(14.4)* | 76<br>*(24.2)* | ...... |
| 19.57<br>*(14.59)* | 2233 | 2.441<br>*(9.240)* | 0.860<br>*(0.523)* | 8.02<br>*(1.579)* | 173<br>*(78.3)* | 57<br>*(13.9)* | 74<br>*(23.6)* | ...... |
| 57.49<br>*(42.87)* | 2186 | 4.142<br>*(15.679)* | 0.497<br>*(0.302)* | 13.88<br>*(2.734)* | 174<br>*(78.6)* | 57<br>*(13.9)* | 74<br>*(23.3)* | ...... |
| **Av** 46.49<br>*Av (34.67)* | 2192 | 3.688<br>*(13.961)* | 0.547<br>*(0.333)* | 12.60<br>*(2.483)* | 178<br>*(81.0)* | 58<br>*(14.2)* | 75<br>*(23.8)* | 28.818<br>*(97.287)* |

## DRAWBAR PERFORMANCE WITH BIAS PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 72.33<br>*(53.94)* | 4219<br>*(18.77)* | 6.43<br>*(10.35)* | 2101 | 5.18 | 5.292<br>*(20.033)* | 0.505<br>*(0.307)* | 13.67<br>*(2.692)* | 174<br>*(78.6)* | 47<br>*(8.3)* | 62<br>*(16.4)* | 29.350<br>*(99.111)* |
| **75% of Pull at Maximum Power—Ten Hours 11th (6L) Gear** | | | | | | | | | | | |
| 58.67<br>*(43.75)* | 3227<br>*(14.35)* | 6.82<br>*(10.97)* | 2202 | 4.18 | 4.785<br>*(18.115)* | 0.563<br>*(0.342)* | 12.26<br>*(2.415)* | 172<br>*(77.9)* | 42<br>*(5.7)* | 54<br>*(12.2)* | 29.288<br>*(98.901)* |
| **50% of Pull at Maximum Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 40.15<br>*(29.94)* | 2151<br>*(9.57)* | 7.00<br>*(11.27)* | 2223 | 2.53 | 3.879<br>*(14.684)* | 0.666<br>*(0.405)* | 10.35<br>*(2.039)* | 170<br>*(76.7)* | 42<br>*(5.3)* | 47<br>*(8.1)* | 29.435<br>*(99.398)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (7L) Gear** | | | | | | | | | | | |
| 40.15<br>*(29.93)* | 2150<br>*(9.56)* | 7.00<br>*(11.26)* | 1520 | 2.49 | 3.118<br>*(11.802)* | 0.536<br>*(0.326)* | 12.87<br>*(2.536)* | 169<br>*(75.8)* | 44<br>*(6.7)* | 53<br>*(11.7)* | 29.450<br>*(99.448)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 57.50<br>*(42.88)* | 8638<br>*(38.42)* | 2.50<br>*(4.02)* | 2196 | 14.88 | 5th (3L) Gear | | | 172<br>*(77.8)* | 42<br>*(5.6)* | 51<br>*(10.6)* | 29.230<br>*(98.705)* |
| 65.04<br>*(48.50)* | 7819<br>*(34.78)* | 3.12<br>*(5.02)* | 2101 | 13.64 | 6th (3H) Gear | | | 174<br>*(78.6)* | 48<br>*(8.9)* | 61<br>*(16.1)* | 29.380<br>*(99.212)* |
| 68.40<br>*(51.01)* | 6998<br>*(31.13)* | 3.67<br>*(5.90)* | 2102 | 10.28 | 7th (4L) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 61<br>*(16.1)* | 29.380<br>*(99.212)* |
| 70.42<br>*(52.51)* | 6195<br>*(27.55)* | 4.26<br>*(6.86)* | 2098 | 8.50 | 8th (5L) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 61<br>*(16.1)* | 29.380<br>*(99.212)* |
| 68.50<br>*(51.08)* | 5250<br>*(23.35)* | 4.89<br>*(7.88)* | 2101 | 6.72 | 9th (4H) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 61<br>*(16.1)* | 29.380<br>*(99.212)* |
| 69.95<br>*(52.16)* | 4660<br>*(20.73)* | 5.63<br>*(9.06)* | 2097 | 5.98 | 10th (5H) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 61<br>*(16.1)* | 29.380<br>*(99.212)* |
| 73.24<br>*(54.61)* | 4276<br>*(19.02)* | 6.42<br>*(10.34)* | 2101 | 5.35 | 11th (6L) Gear | | | 173<br>*(78.3)* | 47<br>*(8.3)* | 59<br>*(15.0)* | 29.390<br>*(99.246)* |
| 70.59<br>*(52.64)* | 3154<br>*(14.03)* | 8.39<br>*(13.51)* | 2098 | 3.73 | 12th (6H) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 60<br>*(15.6)* | 29.380<br>*(99.212)* |

**Department of Agricultural Engineering**

**Dates of Test:** April 2 to May 3, 1982

**Manufacturer:** FORD MOTOR COMPANY, Ford Tractor Operations, 2500 East Maple Road, Troy, Michigan 48084

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.5 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8282 **Fuel weight** 6.896 lbs/gal *(0.826 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.883 gal *(7.129 l)* **Drained from motor** 1.465 gal *(5.547 l)* **Transmission and hydraulic lubricant** Ford 134 fluid **Total time engine was operated** 61.5 hours.

**ENGINE: Make** Ford Diesel **Type** four cylinder vertical with turbocharger **Serial No.** *F635268* **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.4" × 4.4" *(112 mm × 112 mm)* **Compression ratio** 15.6 to 1 **Displacement** 268 cu in *(4392 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard **Serial No.** C681212 **Tread width** rear 60" *(1525 mm)* to 90" *(2285 mm)* front 56" *(1422 mm)* to 84" *(2134 mm)* **Wheel base** 101.6" *(2580 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 31.6" *(804 mm)* Vertical distance above roadway 43.5" *(1105 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 1.3 *(2.2)* second 1.7 *(2.8)* third 2.0 *(3.1)* fourth 2.5 *(4.0)* fifth 2.9 *(4.6)* sixth 3.7 *(5.9)* seventh 4.2 *(6.7)* eighth 4.8 *(7.7)* ninth 5.4 *(8.7)* tenth 6.1 *(9.9)* eleventh 6.9 *(11.2)* twelfth 8.9 *(14.4)* thirteenth 10.2 *(16.3)* fourteenth 13.1 *(21.0)* fifteenth 14.8 *(23.7)* sixteenth 19.0 *(30.6)* reverse 1.7 *(2.8)*, 2.2 *(3.6)*, 2.5 *(4.1)*, 3.3 *(5.3)*, 3.7 *(6.0)*, 4.8 *(7.7)*, 5.4 *(8.7)*, 6.9 *(11.2)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 147" *(3.73 m)* left 147" *(3.73 m)* (on concrete surface without brake) right 169" *(4.29 m)* left 169" *(4.29 m)* **Turning space diameter** (on concrete surface with brake applied) right 302" *(7.67 m)* left 302" *(7.67 m)* (on concrete surface without brake) right 346" *(8.79 m)* left 346" *(8.79 m)* **Power take-off** 1000 rpm at 2048 engine rpm and 540 rpm at 1900 engine rpm.

## LUGGING ABILITY IN 11th (6L) GEAR

| Crankshaft Speed rpm | 2101 | 1898 | 1690 | 1481 | 1246 | 1070 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 4276<br>*(19.02)* | 4587<br>*(20.40)* | 4835<br>*(21.51)* | 4921<br>*(21.89)* | 4358<br>*(19.39)* | 4078<br>*(18.14)* |
| Increase in Pull % | 0 | 7 | 13 | 15 | 2 | –5 |
| Power—Hp<br>*(kW)* | 73.24<br>*(54.61)* | 70.58<br>*(52.63)* | 66.01<br>*(49.23)* | 58.65<br>*(43.73)* | 44.12<br>*(32.90)* | 35.55<br>*(26.51)* |
| Speed—Mph<br>*(km/h)* | 6.42<br>*(10.34)* | 5.77<br>*(9.29)* | 5.12<br>*(8.24)* | 4.47<br>*(7.19)* | 3.80<br>*(6.11)* | 3.27<br>*(5.26)* |
| Slip % | 5.35 | 5.83 | 6.24 | 6.38 | 5.56 | 5.28 |

| TRACTOR SOUND LEVEL WITH CAB | Radials dB(A) | Bias dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 83.0 | 82.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 84.0 |
| 50% of Pull at Maximum Power—Two Hours | | 84.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 79.5 |
| Bystander in 16th (8H) gear | | 88.0 |

## DRAWBAR PERFORMANCE WITH RADIAL PLY TIRES

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th (6L) Gear** | | | | | | | | | | | |
| 74.02<br>*(55.20)* | 4027<br>*(17.91)* | 6.89<br>*(11.10)* | 2099 | 2.37 | 5.347<br>*(20.242)* | 0.498<br>*(0.303)* | 13.84<br>*(2.727)* | 173<br>*(78.3)* | 44<br>*(6.7)* | 53<br>*(11.4)* | 29.215<br>*(98.655)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 65.25<br>*(48.66)* | 9615<br>*(42.77)* | 2.55<br>*(4.10)* | 2132 | 14.42 | 5th (3L) Gear | | | 174<br>*(78.6)* | 49<br>*(9.4)* | 53<br>*(11.7)* | 29.010<br>*(97.962)* |
| 71.11<br>*(53.02)* | 7468<br>*(33.22)* | 3.57<br>*(5.75)* | 2102 | 5.21 | 6th (3H) Gear | | | 173<br>*(78.3)* | 49<br>*(9.4)* | 53<br>*(11.7)* | 29.010<br>*(97.962)* |
| 72.66<br>*(54.18)* | 6685<br>*(29.73)* | 4.08<br>*(6.56)* | 2099 | 4.11 | 7th (4L) Gear | | | 174<br>*(78.9)* | 49<br>*(9.4)* | 53<br>*(11.7)* | 29.010<br>*(97.962)* |
| 73.78<br>*(55.02)* | 5896<br>*(26.22)* | 4.69<br>*(7.55)* | 2102 | 3.44 | 8th (5L) Gear | | | 174<br>*(78.9)* | 49<br>*(9.4)* | 53<br>*(11.7)* | 29.010<br>*(97.962)* |
| 71.11<br>*(53.02)* | 5017<br>*(22.31)* | 5.32<br>*(8.55)* | 2100 | 2.98 | 9th (4H) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 52<br>*(11.1)* | 29.010<br>*(97.962)* |
| 71.86<br>*(53.58)* | 4424<br>*(19.68)* | 6.09<br>*(9.80)* | 2101 | 2.60 | 10th (5H) Gear | | | 174<br>*(78.9)* | 48<br>*(8.9)* | 52<br>*(11.1)* | 29.010<br>*(97.962)* |
| 74.84<br>*(55.80)* | 4071<br>*(18.11)* | 6.89<br>*(11.10)* | 2098 | 2.45 | 11th (6L) Gear | | | 173<br>*(78.3)* | 48<br>*(8.9)* | 52<br>*(11.1)* | 29.010<br>*(97.962)* |
| 71.82<br>*(53.55)* | 3017<br>*(13.42)* | 8.93<br>*(14.37)* | 2100 | 1.75 | 12th (6H) Gear | | | 173<br>*(78.3)* | 48<br>*(8.9)* | 52<br>*(11.1)* | 29.010<br>*(97.962)* |

## LUGGING ABILITY IN 11th (6L) GEAR

| Crankshaft Speed rpm | 2098 | 1897 | 1673 | 1479 | 1258 | 1056 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 4071<br>*(18.11)* | 4409<br>*(19.61)* | 4601<br>*(20.47)* | 4626<br>*(20.58)* | 4215<br>*(18.75)* | 3925<br>*(17.46)* |
| Increase in Pull % | 0 | 8 | 13 | 14 | 4 | –4 |
| Power—Hp<br>*(kW)* | 74.84<br>*(55.80)* | 73.16<br>*(54.56)* | 67.26<br>*(50.16)* | 59.75<br>*(44.55)* | 46.40<br>*(34.60)* | 36.33<br>*(27.09)* |
| Speed—Mph<br>*(km/h)* | 6.89<br>*(11.10)* | 6.22<br>*(10.01)* | 5.48<br>*(8.82)* | 4.84<br>*(7.79)* | 4.13<br>*(6.64)* | 3.47<br>*(5.59)* |
| Slip % | 2.45 | 2.60 | 2.60 | 2.60 | 2.45 | 2.30 |

| TIRES, BALLAST AND WEIGHT | | Bias Ply Tires With Ballast | Bias Ply Tires Without Ballast | Radial Ply Tires With Ballast | Radial Ply Tires Without Ballast |
|---|---|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4R34; 6; 16 *(110)* | Two 18.4R34; 6; 16 *(110)* |
| Ballast | —Liquid (each) | 890 lb *(404 kg)* | None | 948 lb *(430 kg)* | None |
| | —Cast Iron (each) | 120 lb *(54 kg)* | None | None | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* | Two 7.50-18; 6; 40 *(275)* |
| Ballast | —Liquid (each) | None | None | None | None |
| | —Cast Iron (each) | 65 lb *(29 kg)* | None | 65 lb *(29 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator | —Rear | 8030 lb *(3643 kg)* | 6010 lb *(2726 kg)* | 8030 lb *(3643 kg)* | 6135 lb *(2783 kg)* |
| | —Front | 2770 lb *(1256 kg)* | 2640 lb *(1198 kg)* | 2770 lb *(1256 kg)* | 2640 lb *(1197 kg)* |
| | —Total | 10800 lb *(4899 kg)* | 8650 lb *(3924 kg)* | 10800 lb *(4899 kg)* | 8775 lb *(3980 kg)* |

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection was maintained at 140°F *(60.0°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. This tractor did not attain the estimated 15.90 HP-HR per gallon fuel economy at rated engine speed as claimed by the manufacturer.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1433.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

Ford 7710 (16 X 8) Diesel

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1434 — JOHN DEERE 8850 DIESEL
# 16 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—996 rpm)** | | | | | | | | |
| 303.99<br>*(226.69)* | 2100 | 19.311<br>*(73.100)* | 0.442<br>*(0.269)* | 15.74<br>*(3.101)* | 188<br>*(86.9)* | 65<br>*(18.4)* | 76<br>*(24.4)* | 28.730<br>*(97.017)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 263.80<br>*(196.72)* | 2141 | 17.417<br>*(65.931)* | 0.460<br>*(0.280)* | 15.15<br>*(2.984)* | 186<br>*(85.3)* | 66<br>*(18.9)* | 78<br>*(25.8)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2240 | 5.075<br>*(19.211)* | ......<br>...... | ......<br>...... | 170<br>*(76.7)* | 66<br>*(18.6)* | 77<br>*(25.0)* | ......<br>...... |
| 134.65<br>*(100.41)* | 2194 | 11.343<br>*(42.938)* | 0.587<br>*(0.357)* | 11.87<br>*(2.338)* | 176<br>*(79.7)* | 65<br>*(18.3)* | 76<br>*(24.7)* | ......<br>...... |
| 302.56<br>*(225.62)* | 2100 | 19.312<br>*(73.104)* | 0.445<br>*(0.270)* | 15.67<br>*(3.086)* | 190<br>*(87.5)* | 67<br>*(19.4)* | 76<br>*(24.2)* | ......<br>...... |
| 68.17<br>*(50.83)* | 2220 | 8.142<br>*(30.821)* | 0.832<br>*(0.506)* | 8.37<br>*(1.649)* | 174<br>*(78.6)* | 66<br>*(18.9)* | 74<br>*(23.3)* | ......<br>...... |
| 200.14<br>*(149.24)* | 2172 | 14.332<br>*(54.253)* | 0.499<br>*(0.303)* | 13.96<br>*(2.751)* | 180<br>*(81.9)* | 67<br>*(19.4)* | 76<br>*(24.2)* | ......<br>...... |
| **Av** 161.55<br>**Av** *(120.47)* | 2178 | 12.603<br>*(47.708)* | 0.543<br>*(0.331)* | 12.82<br>*(2.525)* | 179<br>*(81.6)* | 66<br>*(18.9)* | 76<br>*(24.6)* | 28.717<br>*(96.972)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 260.77<br>*(201.17)* | 19317<br>*(85.92)* | 5.24<br>*(8.43)* | 2101 | 3.99 | 19.180<br>*(72.634)* | 0.495<br>*(0.301)* | 14.06<br>*(2.770)* | 187<br>*(85.8)* | 66<br>*(18.9)* | 78<br>*(25.6)* | 28.800<br>*(97.253)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (C1) Gear** | | | | | | | | | | | |
| 213.27<br>*(159.03)* | 14735<br>*(65.54)* | 5.43<br>*(8.73)* | 2153 | 2.94 | 15.982<br>*(60.499)* | 0.522<br>*(0.317)* | 13.34<br>*(2.629)* | 180<br>*(82.4)* | 66<br>*(19.0)* | 75<br>*(23.7)* | 28.762<br>*(97.125)* |
| **50% of Pull at Maximum Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 147.39<br>*(109.91)* | 9951<br>*(44.26)* | 5.55<br>*(8.94)* | 2190 | 2.19 | 12.064<br>*(47.902)* | 0.598<br>*(0.364)* | 11.65<br>*(2.294)* | 177<br>*(80.6)* | 62<br>*(16.4)* | 63<br>*(17.2)* | 28.815<br>*(97.304)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 10th (D1) Gear** | | | | | | | | | | | |
| 147.62<br>*(110.08)* | 9948<br>*(44.25)* | 5.56<br>*(8.96)* | 1350 | 1.99 | 10.698<br>*(40.496)* | 0.505<br>*(0.307)* | 13.80<br>*(2.718)* | 176<br>*(80.0)* | 62<br>*(16.7)* | 68<br>*(19.7)* | 28.820<br>*(97.321)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 210.04<br>*(156.63)* | 35330<br>*(157.16)* | 2.23<br>*(3.59)* | 2140 | 14.51 | 2nd (A2) Gear | | | 178<br>*(80.8)* | 61<br>*(16.1)* | 64<br>*(17.8)* | 28.760<br>*(97.118)* |
| 265.87<br>*(198.26)* | 28981<br>*(128.91)* | 3.44<br>*(5.54)* | 2101 | 7.31 | 3rd (A3) Gear | | | 183<br>*(83.6)* | 62<br>*(16.7)* | 69<br>*(20.6)* | 28.850<br>*(97.422)* |
| 268.28<br>*(200.06)* | 25707<br>*(114.35)* | 3.91<br>*(6.30)* | 2101 | 5.91 | 4th (B1) Gear | | | 186<br>*(85.3)* | 64<br>*(17.8)* | 74<br>*(23.3)* | 28.830<br>*(97.355)* |
| 259.95<br>*(193.84)* | 22123<br>*(98.41)* | 4.41<br>*(7.09)* | 2100 | 4.76 | 5th (A4) Gear | | | 187<br>*(85.8)* | 64<br>*(17.8)* | 74<br>*(23.3)* | 28.830<br>*(97.355)* |
| 265.33<br>*(197.86)* | 20026<br>*(89.08)* | 4.97<br>*(8.00)* | 2099 | 4.22 | 6th (B2) Gear | | | 186<br>*(85.6)* | 64<br>*(17.8)* | 73<br>*(22.8)* | 28.830<br>*(97.355)* |
| 274.25<br>*(204.51)* | 19646<br>*(87.39)* | 5.23<br>*(8.42)* | 2101 | 3.99 | 7th (C1) Gear | | | 186<br>*(85.3)* | 64<br>*(17.8)* | 71<br>*(21.7)* | 28.850<br>*(97.422)* |
| 272.91<br>*(203.51)* | 15530<br>*(69.08)* | 6.59<br>*(10.61)* | 2098 | 3.04 | 8th (C2) Gear | | | 186<br>*(85.6)* | 64<br>*(17.8)* | 74<br>*(23.3)* | 28.820<br>*(97.321)* |
| 272.94<br>*(203.53)* | 13990<br>*(62.23)* | 7.32<br>*(11.77)* | 2100 | 2.72 | 9th (B3) Gear | | | 186<br>*(85.6)* | 64<br>*(17.8)* | 74<br>*(23.3)* | 28.820<br>*(97.321)* |
| 272.53<br>*(203.22)* | 11818<br>*(52.57)* | 8.65<br>*(13.92)* | 2101 | 2.24 | 10th (D1) Gear | | | 186<br>*(85.6)* | 65<br>*(18.3)* | 75<br>*(23.9)* | 28.820<br>*(97.321)* |

**Department of Agricultural Engineering**

**Dates of Test:** May 11-21, 1982

**Manufacturer:** JOHN DEFRE TRACTOR WORKS, Waterloo, Iowa 50704

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8364 **Fuel weight** 6.964 lbs/gal *(0.835 kg/l)* **Oil SAE** 15W40 **API service classification** CD CC SD **To motor** 11.254 gal *(42.600 l)* **Drained from motor** 10.284 gal *(38.928 l)* **Transmission and final drive lubricant** John Deere Hy-Gard transmission and hydraulic oil **Total time engine was operated** 43.0 hours.

**ENGINE: Make** John Deere Diesel **Type** eight cylinder vee with turbocharger and intercooler **Serial No.** 8955AR-01 001842 RG **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.51" × 5.00" *(140 mm × 127 mm)* **Compression ratio** 14.5 to 1 **Displacement** 955 cu in *(15649 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Muffler** vertical **Cooling medium temperature control** four thermostats and variable speed fan.

**CHASSIS: Type** four wheel drive with duals **Serial No.** *RW8850H 002113* **Tread width** rear 82" *(2080 mm)* to 140" *(3570 mm)* front 82" *(2080 mm)* to 140" *(3570 mm)* **Wheel base** 133" *(3380 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 78.7" *(1998 mm)* Vertical distance above roadway 40.5" *(1029 mm)* Horizontal distance from center of rear wheel tread 0.2" *(6 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 2.1 *(3.4)* second 2.6 *(4.2)* third 3.8 *(6.0)* fourth 4.2 *(6.8)* fifth 4.7 *(7.6)* sixth 5.3 *(8.5)* seventh 5.5 *(8.9)* eighth 6.9 *(11.1)* ninth 7.6 *(12.3)* tenth 9.0 *(14.4)* eleventh 9.5 *(15.3)* twelfth 10.0 *(16.1)* thirteenth 11.2 *(18.0)* fourteenth 12.5 *(20.0)* fifteenth 16.2 *(26.0)* sixteenth 20.2 *(32.5)* reverse 4.0 *(6.4)*, 4.9 *(8.0)*, 8.0 *(12.9)*, 10.0 *(16.1)*, 10.5 *(17.0)*, 13.2 *(21.2)* **Clutch** wet multiple disc hydraulically power actuated and operated by foot pedal **Brakes** wet disc hydraulically power actuated and operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 264" *(6.71 m)* left 264" *(6.71 m)* **Turning space diameter** (on concrete surface without brake) right 542" *(13.77 m)* left 542" *(13.77 m)* **Power take-off** 996 rpm at 2100 engine rpm.

## LUGGING ABILITY IN 7th (C1) GEAR

| Crankshaft Speed rpm | 2101 | 1890 | 1677 | 1466 | 1259 | 1066 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 19646<br>*(87.39)* | 23052<br>*(102.54)* | 25340<br>*(112.72)* | 25460<br>*(113.25)* | 23918<br>*(106.39)* | 21525<br>*(95.74)* |
| Increase in Pull % | 0 | 17 | 29 | 30 | 22 | 10 |
| Power—Hp<br>*(kW)* | 274.25<br>*(204.51)* | 285.79<br>*(213.11)* | 277.53<br>*(206.95)* | 243.21<br>*(181.36)* | 196.72<br>*(146.69)* | 150.98<br>*(112.59)* |
| Speed—Mph<br>*(km/h)* | 5.23<br>*(8.42)* | 4.65<br>*(7.48)* | 4.11<br>*(6.61)* | 3.58<br>*(5.76)* | 3.08<br>*(4.96)* | 2.63<br>*(4.23)* |
| Slip % | 3.99 | 5.15 | 5.60 | 5.75 | 5.60 | 4.84 |

| **TRACTOR SOUND LEVEL WITH CAB** | **dB(A)** |
|---|---|
| Maximum Available Power—Two Hours | 78.0 |
| 75% of Pull at Maximum Power—Ten Hours | 78.0 |
| 50% of Puli at Maximum Power—Two Hours | 77.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 73.0 |
| Bystander in 15th (D3) gear | 88.5 |

| **TIRES, BALLAST AND WEIGHT** | | **Tested Without Ballast** |
|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Four 24.5-32; 10; 12 *(85)* |
| **Ballast** | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Four 24.5-32; 10; 12 *(85)* |
| **Ballast** | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| **Height of Drawbar** | | 17 in *(430 mm)* |
| **Static Weight with Operator—Rear** | | 15340 lb *(6958 kg)* |
| | —Front | 22360 lb *(10143 kg)* |
| | —Total | 37700 lb *(17101 kg)* |

John Deere 8850 Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 167°F *(74.9°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1434**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Klein, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1435 — JOHN DEERE 8650 DIESEL 16 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp *(kW)* | Crank shaft speed rpm | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—993 rpm)** | | | | | | | | |
| 238.56<br>*(177.89)* | 2100 | 15.364<br>*(58.159)* | 0.449<br>*(0.273)* | 15.53<br>*(3.059)* | 184<br>*(84.2)* | 66<br>*(19.0)* | 75<br>*(23.7)* | 28.670<br>*(96.814)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 207.37<br>*(154.64)* | 2148 | 13.876<br>*(52.526)* | 0.466<br>*(0.283)* | 14.95<br>*(2.944)* | 180<br>*(82.2)* | 66<br>*(18.9)* | 76<br>*(24.4)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2243 | 4.136<br>*(15.656)* | .....<br>..... | .....<br>..... | 172<br>*(78.1)* | 66<br>*(18.9)* | 75<br>*(23.9)* | ......<br>...... |
| 106.44<br>*(79.37)* | 2200 | 8.960<br>*(33.917)* | 0.586<br>*(0.357)* | 11.88<br>*(2.340)* | 178<br>*(81.4)* | 66<br>*(19.2)* | 76<br>*(24.4)* | ......<br>...... |
| 239.17<br>*(178.35)* | 2100 | 15.482<br>*(58.606)* | 0.451<br>*(0.274)* | 15.45<br>*(3.043)* | 184<br>*(84.7)* | 67<br>*(19.4)* | 76<br>*(24.4)* | ......<br>...... |
| 53.43<br>*(39.84)* | 2220 | 6.591<br>*(24.950)* | 0.859<br>*(0.523)* | 8.11<br>*(1.597)* | 174<br>*(78.9)* | 66<br>*(18.9)* | 76<br>*(24.4)* | ......<br>...... |
| 157.41<br>*(117.38)* | 2172 | 11.334<br>*(42.904)* | 0.501<br>*(0.305)* | 13.89<br>*(2.736)* | 180<br>*(82.2)* | 66<br>*(18.9)* | 76<br>*(24.2)* | ......<br>...... |
| **Av** 127.30<br>**Av** *(94.93)* | 2180 | 10.063<br>*(38.093)* | 0.551<br>*(0.335)* | 12.65<br>*(2.493)* | 178<br>*(81.3)* | 66<br>*(19.1)* | 76<br>*(24.3)* | 28.653<br>*(96.750)* |

## DRAWBAR PERFORMANCE

| Power Hp *(kW)* | Drawbar pull lbs *(kN)* | Speed mph *(km/h)* | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr *(l/h)* | lb/hp.hr *(kg/kW.h)* | Hp.hr/gal *(kW.h/l)* | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg *(kPa)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 219.93<br>*(164.00)* | 14865<br>*(66.12)* | 5.55<br>*(8.93)* | 2100 | 3.41 | 15.419<br>*(58.366)* | 0.488<br>*(0.297)* | 14.26<br>*(2.810)* | 182<br>*(83.1)* | 57<br>*(13.9)* | 63<br>*(16.9)* | 28.925<br>*(97.675)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (C1) Gear** | | | | | | | | | | | |
| 170.50<br>*(127.14)* | 11099<br>*(49.37)* | 5.76<br>*(9.27)* | 2164 | 2.60 | 12.898<br>*(48.826)* | 0.527<br>*(0.320)* | 13.22<br>*(2.604)* | 180<br>*(82.3)* | 54<br>*(12.1)* | 55<br>*(12.7)* | 28.777<br>*(97.176)* |
| **50% of Pull at Maximum Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 116.02<br>*(86.51)* | 7402<br>*(32.93)* | 5.88<br>*(9.46)* | 2184 | 1.66 | 10.070<br>*(38.118)* | 0.604<br>*(0.368)* | 11.52<br>*(2.270)* | 181<br>*(82.8)* | 67<br>*(19.2)* | 71<br>*(21.4)* | 28.755<br>*(97.101)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 10th (D1) Gear** | | | | | | | | | | | |
| 116.21<br>*(86.66)* | 7402<br>*(32.93)* | 5.89<br>*(9.47)* | 1330 | 1.49 | 8.562<br>*(32.410)* | 0.513<br>*(0.312)* | 13.57<br>*(2.674)* | 182<br>*(83.1)* | 68<br>*(20.0)* | 74<br>*(23.1)* | 28.735<br>*(97.034)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 178.18<br>*(132.87)* | 28257<br>*(125.69)* | 2.36<br>*(3.81)* | 2141 | 14.53 | 2nd (A2) Gear | | | 181<br>*(82.8)* | 50<br>*(10.0)* | 52<br>*(11.1)* | 28.929<br>*(97.659)* |
| 217.28<br>*(162.03)* | 21915<br>*(97.48)* | 3.72<br>*(5.98)* | 2101 | 5.37 | 3rd (A3) Gear | | | 182<br>*(83.1)* | 56<br>*(13.3)* | 59<br>*(15.0)* | 28.930<br>*(97.692)* |
| 220.79<br>*(164.65)* | 19847<br>*(88.28)* | 4.17<br>*(6.71)* | 2099 | 4.67 | 4th (B1) Gear | | | 182<br>*(83.3)* | 56<br>*(13.3)* | 59<br>*(15.0)* | 28.920<br>*(97.659)* |
| 212.64<br>*(158.56)* | 16909<br>*(75.21)* | 4.72<br>*(7.59)* | 2100 | 3.81 | 5th (A4) Gear | | | 182<br>*(83.3)* | 55<br>*(12.8)* | 58<br>*(14.4)* | 28.920<br>*(97.659)* |
| 216.40<br>*(161.37)* | 15387<br>*(68.44)* | 5.27<br>*(8.49)* | 2100 | 3.41 | 6th (B2) Gear | | | 183<br>*(83.6)* | 55<br>*(12.8)* | 58<br>*(14.4)* | 28.920<br>*(97.659)* |
| 221.80<br>*(165.40)* | 14982<br>*(66.64)* | 5.55<br>*(8.93)* | 2101 | 3.33 | 7th (C1) Gear | | | 182<br>*(83.1)* | 52<br>*(11.1)* | 55<br>*(12.8)* | 28.930<br>*(97.692)* |
| 216.11<br>*(161.16)* | 11612<br>*(51.65)* | 6.98<br>*(11.23)* | 2100 | 2.60 | 8th (C2) Gear | | | 182<br>*(83.1)* | 56<br>*(13.3)* | 59<br>*(15.0)* | 28.930<br>*(97.692)* |
| 217.70<br>*(162.34)* | 10574<br>*(47.04)* | 7.72<br>*(12.42)* | 2099 | 2.44 | 9th (B3) Gear | | | 181<br>*(82.8)* | 56<br>*(13.3)* | 60<br>*(15.6)* | 28.930<br>*(97.692)* |
| 215.88<br>*(160.98)* | 8881<br>*(39.50)* | 9.12<br>*(14.67)* | 2099 | 1.87 | 10th (D1) Gear | | | 182<br>*(83.3)* | 56<br>*(13.3)* | 60<br>*(15.6)* | 28.930<br>*(97.692)* |

**Department of Agricultural Engineering**

**Dates of Test:** May 13-24, 1982

**Manufacturer:** JOHN DEERE TRACTOR WORKS, Waterloo, Iowa 50704

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8364 **Fuel weight** 6.964 lbs/gal *(0.835 kg/l)* **Oil SAE** 15W40 **API service classification** CD CC SD **To motor** 6.098 gal *(23.082 l)* **Drained from motor** 5.379 gal *(20.360 l)* **Transmission and hydraulic lubricant** John Deere Hy-Gard transmission and hydraulic oil **Total time engine was operated** 36.0 hours.

**ENGINE:** **Make** John Deere Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 6619AR-11 044713RG **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 5.125" × 5.00" *(130.2 mm × 127.0 mm)* **Compression ratio** 15.2 to 1 **Displacement** 619 cu in *(10143 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** three thermostats.

**CHASSIS:** **Type** four wheel drive with duals **Serial No.** *RW8650H001584* **Tread width** rear 66" *(1680 mm)* to 129" *(3280 mm)* front 66" *(1680 mm)* to 129" *(3280 mm)* **Wheel base** 125" *(3175 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 66.0" *(1675 mm)* Vertical distance above roadway 41.3" *(1049 mm)* Horizontal distance from center of rear wheel tread 0.9" *(23 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled power shift **Advertised speeds mph** *(km/h)* first 2.1 *(3.4)* second 2.6 *(4.2)* third 3.8 *(6.1)* fourth 4.2 *(6.8)* fifth 4.7 *(7.6)* sixth 5.3 *(8.5)* seventh 5.5 *(8.9)* eighth 6.9 *(11.1)* ninth 7.6 *(12.2)* tenth 9.0 *(14.4)* eleventh 9.5 *(15.3)* twelfth 10.0 *(16.1)* thirteenth 11.2 *(18.0)* fourteenth 12.4 *(20.0)* fifteenth 16.2 *(26.0)* sixteenth 20.2 *(32.5)* reverse 4.1 *(6.6)*, 5.1 *(8.2)*, 8.2 *(13.3)*, 10.3 *(16.5)*, 10.9 *(17.5)*, 13.5 *(21.7)* **Clutch** wet multiple disc hydraulically power actuated and operated by foot pedal **Brakes** wet disc hydraulically power actuated and operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 245" *(6.22 m)* left 245" *(6.22 m)* **Turning space diameter** (on concrete surface without brake) right 499" *(12.67 m)* left 499" *(12.67 m)* **Power take-off** 993 rpm at 2100 engine rpm.

## LUGGING ABILITY IN 7th (C1) GEAR

| Crankshaft Speed rpm | 2101 | 1890 | 1681 | 1471 | 1261 | 1051 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 14982<br>*(66.64)* | 17105<br>*(76.09)* | 18134<br>*(80.66)* | 20056<br>*(89.21)* | 20049<br>*(89.18)* | 19036<br>*(84.68)* |
| Increase in Pull % | 0 | 14 | 21 | 34 | 34 | 27 |
| Power—Hp *(kW)* | 221.80<br>*(165.40)* | 226.39<br>*(168.82)* | 212.93<br>*(158.78)* | 204.86<br>*(152.76)* | 175.43<br>*(130.82)* | 139.28<br>*(103.86)* |
| Speed—Mph *(km/h)* | 5.55<br>*(8.93)* | 4.96<br>*(7.99)* | 4.40<br>*(7.09)* | 3.83<br>*(6.16)* | 3.28<br>*(5.28)* | 2.74<br>*(4.42)* |
| Slip % | 3.33 | 3.81 | 4.12 | 4.75 | 4.75 | 4.44 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 76.5 |
| 75% of Pull at Maximum Power—Ten Hours | 76.5 |
| 50% of Pull at Maximum Power—Two Hours | 76.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 73.0 |
| Bystander in 15th (D3) gear | 88.5 |

| TIRES, BALLAST AND WEIGHT | | Tested Without Ballast |
|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; 12 *(85)* |
| Ballast | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; 12 *(85)* |
| Ballast | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Height of Drawbar | | 17.5 in *(445 mm)* |
| Static Weight with Operator—Rear | | 14310 lb *(6491 kg)* |
| | —Front | 15960 lb *(7239 kg)* |
| | —Total | 30270 lb *(13730 kg)* |

John Deere 8650 Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 161°F *(71.9°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1435.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1436 — JOHN DEERE 8450 DIESEL
## 16 SPEED

### POWER TAKE-OFF PERFORMANCE

| | Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| | **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| | **Rated Engine Speed—Two Hours (PTO Speed—993 rpm)** | | | | | | | | |
| | 186.98<br>*(139.43)* | 2100 | 11.915<br>*(45.103)* | 0.444<br>*(0.270)* | 15.69<br>*(3.091)* | 186<br>*(85.5)* | 63<br>*(17.3)* | 75<br>*(23.9)* | 28.793<br>*(97.231)* |
| | **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| | 161.70<br>*(120.58)* | 2139 | 10.550<br>*(39.936)* | 0.454<br>*(0.276)* | 15.33<br>*(3.019)* | 181<br>*(82.8)* | 63<br>*(17.2)* | 75<br>*(23.9)* | ......<br>...... |
| | 0.00<br>*(0.00)* | 2239 | 3.063<br>*(11.595)* | ......<br>...... | ......<br>...... | 174<br>*(78.9)* | 63<br>*(17.2)* | 76<br>*(24.2)* | ......<br>...... |
| | 82.93<br>*(61.84)* | 2195 | 6.875<br>*(26.025)* | 0.577<br>*(0.351)* | 12.06<br>*(2.376)* | 179<br>*(81.7)* | 63<br>*(17.2)* | 75<br>*(23.9)* | ......<br>...... |
| | 187.65<br>*(139.93)* | 2100 | 11.984<br>*(45.364)* | 0.445<br>*(0.271)* | 15.66<br>*(3.085)* | 186<br>*(85.6)* | 64<br>*(17.5)* | 76<br>*(24.2)* | ......<br>...... |
| | 41.80<br>*(31.17)* | 2208 | 5.049<br>*(19.113)* | 0.841<br>*(0.512)* | 8.28<br>*(1.631)* | 175<br>*(79.4)* | 63<br>*(17.2)* | 74<br>*(23.3)* | ......<br>...... |
| | 122.65<br>*(91.46)* | 2163 | 8.698<br>*(32.926)* | 0.494<br>*(0.300)* | 14.10<br>*(2.778)* | 181<br>*(82.8)* | 63<br>*(17.2)* | 74<br>*(23.6)* | ......<br>...... |
| **Av**<br>*Av* | **99.46**<br>*(74.17)* | **2174** | **7.703**<br>*(29.159)* | **0.539**<br>*(0.328)* | **12.91**<br>*(2.544)* | **179**<br>*(81.8)* | **63**<br>*(17.3)* | **75**<br>*(23.8)* | **28.773**<br>*(97.163)* |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 173.32<br>*(129.39)* | 10904<br>*(48.50)* | 5.97<br>*(9.60)* | 2100 | 2.86 | 12.008<br>*(45.456)* | 0.482<br>*(0.293)* | 14.45<br>*(2.847)* | 185<br>*(84.7)* | 63<br>*(17.2)* | 68<br>*(19.7)* | 28.580<br>*(96.510)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (C1) Gear** | | | | | | | | | | | |
| 137.24<br>*(102.34)* | 8325<br>*(37.03)* | 6.18<br>*(9.95)* | 2161 | 2.21 | 10.145<br>*(38.403)* | 0.515<br>*(0.313)* | 13.53<br>*(2.665)* | 182<br>*(83.1)* | 62<br>*(16.7)* | 63<br>*(16.9)* | 28.700<br>*(96.916)* |
| **50% of Pull at Maximum Power—Two Hours 7th (C1) Gear** | | | | | | | | | | | |
| 93.34<br>*(69.60)* | 5551<br>*(24.69)* | 6.31<br>*(10.15)* | 2190 | 1.56 | 8.023<br>*(30.372)* | 0.599<br>*(0.364)* | 11.63<br>*(2.292)* | 181<br>*(82.8)* | 61<br>*(16.1)* | 62<br>*(16.7)* | 28.905<br>*(97.608)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 10th (D1) Gear** | | | | | | | | | | | |
| 93.05<br>*(69.39)* | 5552<br>*(24.70)* | 6.29<br>*(10.11)* | 1347 | 1.61 | 6.803<br>*(25.752)* | 0.509<br>*(0.310)* | 13.68<br>*(2.695)* | 183<br>*(83.9)* | 62<br>*(16.4)* | 63<br>*(16.9)* | 28.890<br>*(97.557)* |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 142.38<br>*(106.17)* | 26567<br>*(118.18)* | 2.01<br>*(3.23)* | 2128 | 14.90 | 1st (A1) Gear | 183<br>*(83.6)* | 59<br>*(15.0)* | 61<br>*(16.1)* | 28.550<br>*(96.409)* |
| 163.32<br>*(121.79)* | 22888<br>*(101.81)* | 2.68<br>*(4.31)* | 2099 | 7.89 | 2nd (A2) Gear | 184<br>*(84.4)* | 62<br>*(16.7)* | 64<br>*(17.8)* | 28.580<br>*(96.510)* |
| 173.56<br>*(129.42)* | 16221<br>*(72.15)* | 4.01<br>*(6.46)* | 2097 | 4.57 | 3rd (A3) Gear | 185<br>*(85.0)* | 61<br>*(16.1)* | 63<br>*(17.2)* | 28.580<br>*(96.510)* |
| 175.73<br>*(131.04)* | 14646<br>*(65.15)* | 4.50<br>*(7.24)* | 2099 | 3.93 | 4th (B1) Gear | 185<br>*(85.0)* | 61<br>*(16.1)* | 63<br>*(17.2)* | 28.570<br>*(96.477)* |
| 170.45<br>*(127.11)* | 12584<br>*(55.98)* | 5.08<br>*(8.17)* | 2101 | 3.36 | 5th (A4) Gear | 185<br>*(85.0)* | 61<br>*(16.1)* | 63<br>*(17.2)* | 28.570<br>*(96.477)* |
| 172.49<br>*(128.63)* | 11402<br>*(50.72)* | 5.67<br>*(9.13)* | 2100 | 3.03 | 6th (B2) Gear | 185<br>*(85.0)* | 60<br>*(15.6)* | 62<br>*(16.7)* | 28.570<br>*(96.477)* |
| 175.02<br>*(130.51)* | 10995<br>*(48.91)* | 5.97<br>*(9.61)* | 2101 | 3.03 | 7th (C1) Gear | 185<br>*(85.0)* | 60<br>*(15.6)* | 62<br>*(16.7)* | 28.570<br>*(96.477)* |
| 170.66<br>*(127.26)* | 8543<br>*(38.00)* | 7.49<br>*(12.06)* | 2098 | 2.28 | 8th (C2) Gear | 185<br>*(85.0)* | 62<br>*(16.7)* | 64<br>*(17.8)* | 28.580<br>*(96.510)* |
| 170.60<br>*(127.21)* | 7698<br>*(34.24)* | 8.31<br>*(13.38)* | 2101 | 1.86 | 9th (B3) Gear | 184<br>*(84.4)* | 62<br>*(16.7)* | 65<br>*(18.3)* | 28.580<br>*(96.510)* |

**Department of Agricultural Engineering**

**Dates of Test:** May 12-27, 1982

**Manufacturer:** JOHN DEERE TRACTOR WORKS, Waterloo, Iowa 50704

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8364 **Fuel weight** 6.964 lbs/gal *(0.835 kg/l)* **Oil SAE** 15W40 **API service classification** CD CC SD **To motor** 4.584 gal *(17.353 l)* **Drained from motor** 4.087 gal *(15.471 l)* **Transmission and final drive lubricant** John Deere Hy-Gard transmission and hydraulic oil **Total time engine was operated** 49.0 hours.

**ENGINE:** **Make** John Deere Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 6466AR-13 209127RG **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.5625" × 4.75" *(115.8 mm × 120.6 mm)* **Compression ratio** 15.5 to 1 **Displacement** 466 cu in *(7636 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** two thermostats.

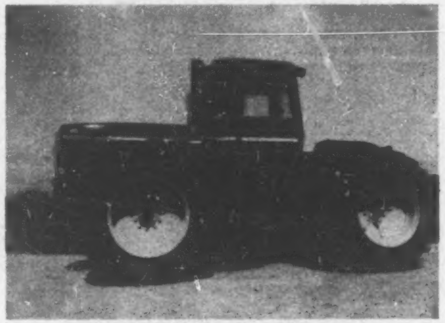
**CHASSIS:** **Type** four wheel drive with duals **Serial No.** *RW8450H 001185* **Tread width** rear 72" *(1820 mm)* to 129" *(3280 mm)* front 72" *(1820 mm)* to 129" *(3280 mm)* **Wheel base** 125" *(3175 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 64.0" *(1626 mm)* Vertical distance above roadway 41.3" *(1049 mm)* Horizontal distance from center of rear wheel tread 0.5" *(13 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 2.3 *(3.7)* second 2.8 *(4.6)* third 4.1 *(6.6)* fourth 4.6 *(7.4)* fifth 5.2 *(8.3)* sixth 5.7 *(9.2)* seventh 6.0 *(9.7)* eighth 7.5 *(12.1)* ninth 8.3 *(13.4)* tenth 9.8 *(15.7)* eleventh 10.4 *(16.7)* twelfth 10.9 *(17.5)* thirteenth 12.2 *(19.6)* fourteenth 13.6 *(21.9)* fifteenth 17.6 *(28.4)* sixteenth 22.0 *(35.4)* reverse 4.5 *(7.2)*, 5.6 *(9.0)*, 9.0 *(14.5)*, 11.2 *(18.0)*, 11.8 *(19.0)*, 14.7 *(23.7)* **Clutch** wet multiple disc hydraulically power actuated and operated by foot pedal **Brakes** wet disc hydraulically power actuated and operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 243" *(6.17 m)* left 243" *(6.17 m)* **Turning space diameter** (on concrete surface without brake) right 495" *(12.57 m)* left 495" *(12.57 m)* **Power take-off** 993 rpm at 2100 engine rpm.

### LUGGING ABILITY IN 7th (C1) GEAR

| Crankshaft Speed rpm | 2101 | 1888 | 1685 | 1465 | 1261 | 1041 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 10995<br>*(48.91)* | 12467<br>*(55.46)* | 13594<br>*(60.47)* | 13950<br>*(62.05)* | 13193<br>*(58.69)* | 12004<br>*(53.40)* |
| Increase in Pull % | 0 | 13 | 24 | 27 | 20 | 9 |
| Power—Hp<br>*(kW)* | 175.02<br>*(130.51)* | 177.70<br>*(132.51)* | 172.34<br>*(128.51)* | 153.50<br>*(114.47)* | 125.18<br>*(93.34)* | 94.36<br>*(70.37)* |
| Speed—Mph<br>*(km/h)* | 5.97<br>*(9.61)* | 5.35<br>*(8.60)* | 4.75<br>*(7.65)* | 4.13<br>*(6.64)* | 3.56<br>*(5.73)* | 2.95<br>*(4.74)* |
| Slip % | 3.03 | 3.36 | 3.52 | 3.68 | 3.52 | 3.36 |

| **TRACTOR SOUND LEVEL WITH CAB** | **dB(A)** |
|---|---|
| Maximum Available Power—Two Hours | 77.5 |
| 75% of Pull at Maximum Power—Ten Hours | 77.0 |
| 50% of Pull at Maximum Power—Two Hours | 76.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 73.0 |
| Bystander in 15th (D3) gear | 87.0 |

| **TIRES, BALLAST AND WEIGHT** | | **Tested Without Ballast** |
|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Four 20.8-38; 8; 12 *(85)* |
| **Ballast** | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Four 20.8-38; 8; 12 *(85)* |
| **Ballast** | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| **Height of Drawbar** | | 17.5 in *(445 mm)* |
| **Static Weight with Operator** | —Rear | 14230 lb *(64[illegible]5 kg)* |
| | —Front | 14920 lb *(67[illegible]8 kg)* |
| | —Total | 29150 lb *(132[illegible] kg)* |



John Deere 8450 Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 150°F *(65.7°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1436**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1437 — JOHN DEERE 1250 DIESEL
## 9 SPEED

### POWER TAKE-OFF PERFORMANCE

| | Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—588 rpm)** | | | | | | | | | |
| | 40.70<br>(30.35) | 2500 | 2.439<br>(9.233) | 0.417<br>(0.254) | 16.69<br>(3.287) | 189<br>(87.2) | 64<br>(18.0) | 76<br>(24.2) | 28.820<br>(97.321) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | | |
| | 40.98<br>(30.56) | 2294 | 2.411<br>(9.127) | 0.410<br>(0.249) | 17.00<br>(3.348) | 189<br>(87.4) | 63<br>(17.4) | 75<br>(23.8) | 28.820<br>(97.321) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | | |
| | 35.57<br>(26.52) | 2570 | 2.206<br>(8.351) | 0.432<br>(0.263) | 16.13<br>(3.176) | 186<br>(85.3) | 63<br>(17.2) | 76<br>(24.2) | ......<br>...... |
| | 0.00<br>(0.00) | 2650 | 0.732<br>(2.771) | ......<br>...... | ......<br>...... | 182<br>(83.3) | 64<br>(17.8) | 76<br>(24.2) | ......<br>...... |
| | 17.95<br>(13.39) | 2595 | 1.413<br>(5.349) | 0.548<br>(0.334) | 12.70<br>(2.503) | 185<br>(85.0) | 64<br>(17.8) | 75<br>(23.9) | ......<br>...... |
| | 40.96<br>(30.54) | 2500 | 2.434<br>(9.214) | 0.414<br>(0.252) | 16.83<br>(3.315) | 188<br>(86.9) | 64<br>(17.8) | 76<br>(24.4) | ......<br>...... |
| | 9.06<br>(6.76) | 2618 | 1.034<br>(3.914) | 0.795<br>(0.483) | 8.76<br>(1.727) | 183<br>(83.9) | 64<br>(17.8) | 76<br>(24.4) | ......<br>...... |
| | 26.64<br>(19.87) | 2566 | 1.783<br>(6.749) | 0.466<br>(0.284) | 14.94<br>(2.944) | 185<br>(85.0) | 64<br>(17.8) | 76<br>(24.2) | ......<br>...... |
| **Av**<br>*Av* | **21.70**<br>(16.18) | **2583** | **1.600**<br>(6.057) | **0.514**<br>(0.313) | **13.56**<br>(2.671) | **185**<br>(84.9) | **64**<br>(17.7) | **76**<br>(24.2) | **28.817**<br>(97.310) |

### DRAWBAR PERFORMANCE
### (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th (II-3) Gear** | | | | | | | | | | | |
| 33.44<br>(24.93) | 2326<br>(10.35) | 5.39<br>(8.68) | 2499 | 6.29 | 2.405<br>(9.105) | 0.501<br>(0.305) | 13.90<br>(2.739) | 190<br>(87.8) | 66<br>(18.9) | 76<br>(24.4) | 28.705<br>(96.932) |
| **75% of Pull at Maximum Power—Ten Hours 6th (II-3) Gear** | | | | | | | | | | | |
| 26.66<br>(19.88) | 1775<br>(7.90) | 5.63<br>(9.06) | 2579 | 5.07 | 2.096<br>(7.936) | 0.548<br>(0.333) | 12.71<br>(2.505) | 187<br>(86.0) | 64<br>(18.0) | 68<br>(19.9) | 28.550<br>(96.679) |
| **50% of Pull at Maximum Power—Two Hours 6th (II-3) Gear** | | | | | | | | | | | |
| 18.21<br>(13.58) | 1183<br>(5.26) | 5.77<br>(9.29) | 2592 | 3.21 | 1.705<br>(6.455) | 0.652<br>(0.397) | 10.68<br>(2.104) | 192<br>(88.6) | 65<br>(18.3) | 69<br>(20.3) | 28.665<br>(96.797) |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th (III-1) Gear** | | | | | | | | | | | |
| 18.23<br>(13.59) | 1183<br>(5.26) | 5.78<br>(9.30) | 1883 | 3.06 | 1.364<br>(5.164) | 0.521<br>(0.317) | 13.36<br>(2.632) | 185<br>(84.7) | 67<br>(19.2) | 73<br>(22.5) | 28.705<br>(96.932) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 25.86<br>(19.29) | 3750<br>(16.68) | 2.59<br>(4.16) | 2581 | 14.63 | 4th (II-1) Gear | | | 186<br>(85.3) | 64<br>(17.8) | 64<br>(17.8) | 28.610<br>(96.612) |
| 33.04<br>(24.64) | 3221<br>(14.33) | 3.85<br>(6.19) | 2498 | 10.02 | 5th(II-2) Gear | | | 189<br>(86.9) | 62<br>(16.7) | 66<br>(18.9) | 28.680<br>(96.848) |
| 34.01<br>(25.36) | 2366<br>(10.52) | 5.39<br>(8.68) | 2497 | 6.15 | 6th (II-3) Gear | | | 189<br>(86.9) | 63<br>(17.2) | 68<br>(20.0) | 28.690<br>(96.882) |
| 33.51<br>(24.99) | 1654<br>(7.36) | 7.60<br>(12.23) | 2502 | 4.11 | 7th (III-1) Gear | | | 188<br>(86.7) | 63<br>(17.2) | 69<br>(20.6) | 28.700<br>(96.916) |

### LUGGING ABILITY IN 6th (II-3) GEAR

| Crankshaft Speed rpm | 2497 | 2253 | 1996 | 1751 | 1492 | 1242 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 2366<br>(10.52) | 2640<br>(11.74) | 2767<br>(12.31) | 2838<br>(12.62) | 2912<br>(12.95) | 2902<br>(12.91) |
| Increase in Pull % | 0 | 12 | 17 | 20 | 23 | 23 |
| Power—Hp<br>(kW) | 34.01<br>(25.36) | 33.87<br>(25.26) | 31.25<br>(23.31) | 28.05<br>(20.92) | 24.39<br>(18.19) | 20.24<br>(15.10) |
| Speed—Mph<br>(km/h) | 5.39<br>(8.68) | 4.81<br>(7.74) | 4.24<br>(6.82) | 3.71<br>(5.97) | 3.14<br>(5.06) | 2.61<br>(4.21) |
| Slip % | 6.15 | 7.27 | 7.82 | 7.98 | 8.58 | 8.48 |

**Department of Agricultural Engineering**

**Dates of Test:** May 13 to June 1, 1982

**Manufacturer:** YANMAR DIESEL ENGINE COMPANY LTD., Osaka, Japan

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8364 **Fuel weight** 6.964 lbs/gal *(0.835 kg/l)* **Oil SAE** 15W40 **API service classification** CD CC SD **To motor** 2.264 gal *(8.569 l)* **Drained from motor** 2.042 gal *(7.731 l)* **Transmission and hydraulic lubricant** John Deere Hy Gard transmission and hydraulic oil **Front axle lubricant** SAE 90 **Total time engine was operated** 42.5 hours.

**ENGINE:** **Make** Yanmar Diesel **Type** three cylinder vertical **Serial No.** 3T95J-00162 **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 3.74" × 4.33" *(95 mm × 110 mm)* **Compression ratio** 16.4 to 1 **Displacement** 143 cu in *(2339 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Fuel filter** one paper cartridge and one mesh strainer **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** 1250 A 001080 CH **Tread width** rear 51.1" *(1300 mm)* to 78.7" *(2000 mm)* front 55.1" *(1400 mm)* to 74.8" *(1900 mm)* **Wheel base** 78.1" *(1983 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 35.0" *(888 mm)* Vertical distance above roadway 27.1" *(688 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** *(km/h)* first 1.2 *(2.0)* second 1.8 *(2.9)* third 2.4 *(3.9)* fourth 2.9 *(4.7)* fifth 4.3 *(6.9)* sixth 5.7 *(9.2)* seventh 7.9 *(12.6)* eighth 11.5 *(18.4)* ninth 15.4 *(24.8)* reverse 1.9 *(3.0)*, 4.3 *(6.9)* **Clutch** single plate dry disc operated by foot pedal **Brakes** wet disc hydraulically operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 122" *(3.1 m)* left 122" *(3.1 m)* (on concrete surface without brake) right 142" *(3.6 m)* left 142" *(3.6 m)* **Turning space diameter** (on concrete surface with brake applied) right 254" *(6.44 m)* left 254" *(6.44 m)* (on concrete surface without brake) right 293" *(7.44 m)* left 293" *(7.44 m)* **Power take-off** 540 rpm at 2294 engine rpm.

**REPAIRS and ADJUSTMENTS:** The throttle lever friction disc was tightened after the 10 hour drawbar test.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 95.5 | 95.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 94.5 |
| 50% of Pull at Maximum Power—Two Hours | | 94.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 91.5 |
| Bystander in 9th (III-3) gear | | 83.5 |

### DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 6th (II-3) Gear** | | | | | | | | | | | |
| 33.36<br>(24.88) | 2232<br>(9.93) | 5.61<br>(9.02) | 2499 | 4.23 | 2.441<br>(9.241) | 0.510<br>(0.310) | 13.67<br>(2.692) | 189<br>(87.2) | 67<br>(19.4) | 79<br>(25.8) | 28.685<br>(96.865) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 30.16<br>(22.49) | 5164<br>(22.97) | 2.19<br>(3.52) | 2555 | 14.68 | 3rd (I-3) Gear | | | 188<br>(86.4) | 64<br>(17.8) | 65<br>(18.3) | 28.620<br>(96.645) |
| 33.62<br>(25.07) | 4749<br>(21.12) | 2.65<br>(4.27) | 2500 | 11.14 | 4th (II-1) Gear | | | 188<br>(86.7) | 64<br>(17.8) | 66<br>(18.9) | 28.640<br>(96.713) |
| 34.09<br>(25.42) | 3128<br>(13.91) | 4.09<br>(6.58) | 2500 | 6.21 | 5th (II-2) Gear | | | 189<br>(86.9) | 61<br>(16.1) | 65<br>(18.3) | 28.680<br>(96.848) |
| 33.85<br>(25.24) | 2263<br>(10.07) | 5.61<br>(9.03) | 2500 | 4.32 | 6th (II-3) Gear | | | 189<br>(86.9) | 67<br>(19.4) | 78<br>(25.6) | 28.690<br>(96.882) |
| 33.14<br>(24.71) | 1585<br>(7.05) | 7.84<br>(12.62) | 2502 | 2.79 | 7th (III-1) Gear | | | 189<br>(86.9) | 63<br>(17.2) | 69<br>(20.6) | 28.710<br>(96.949) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 14.9-28; 6; 14 (95) | Two 14.9-28; 6; 14 (95) |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 27 lb (12 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 9.5-24; 4; 16 (110) | Two 9.5-24; 4; 16 (110) |
| Ballast | —Liquid (each) | None | None |
| | —Test Equip. (each) | 18 lb (8 kg) | None |
| Height of Drawbar | | 17 in (430 mm) | 17 in (430 mm) |
| Static Weight with Operator | —Rear | 2955 lb (1340 kg) | 2900 lb (1316 kg) |
| | —Front | 2225 lb (1009 kg) | 2190 lb (993 kg) |
| | —Total | 5180 lb (2349 kg) | 5090 lb (2309 kg) |

John Deere 1250 Diesel

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 136°F *(57.6°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1437**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Robert W. Klein, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1438 — INTERNATIONAL 3288 DIESEL
## 16 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1159 rpm)** | | | | | | | | |
| 90.46<br>(67.46) | 2400 | 6.065<br>(22.959) | 0.467<br>(0.284) | 14.92<br>(2.938) | 187<br>(85.9) | 58<br>(14.4) | 75<br>(23.8) | 29.073<br>(98.176) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 88.33<br>(65.87) | 2071 | 5.540<br>(20.971) | 0.437<br>(0.266) | 15.94<br>(3.141) | 190<br>(87.7) | 57<br>(14.1) | 76<br>(24.2) | 29.060<br>(98.131) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 81.08<br>(60.46) | 2528 | 5.645<br>(21.369) | 0.485<br>(0.295) | 14.36<br>(2.829) | 184<br>(84.2) | 58<br>(14.2) | 76<br>(24.4) | ......<br>...... |
| 0.00<br>(0.00) | 2670 | 2.207<br>(8.354) | .....<br>..... | .....<br>..... | 175<br>(79.4) | 57<br>(13.9) | 76<br>(24.2) | ......<br>...... |
| 41.48<br>(30.93) | 2596 | 3.760<br>(14.233) | 0.632<br>(0.385) | 11.03<br>(2.173) | 180<br>(82.2) | 58<br>(14.4) | 76<br>(24.4) | ......<br>...... |
| 90.79<br>(67.70) | 2400 | 6.088<br>(23.046) | 0.468<br>(0.284) | 14.91<br>(2.938) | 187<br>(86.1) | 57<br>(13.9) | 76<br>(24.2) | ......<br>...... |
| 21.33<br>(15.91) | 2650 | 2.994<br>(11.334) | 0.979<br>(0.595) | 7.12<br>(1.404) | 176<br>(80.3) | 57<br>(13.9) | 76<br>(24.2) | ......<br>...... |
| 61.68<br>(45.99) | 2567 | 4.664<br>(17.655) | 0.527<br>(0.321) | 13.23<br>(2.603) | 182<br>(83.3) | 58<br>(14.2) | 78<br>(25.3) | ......<br>...... |
| Av 49.39<br>Av (36.83) | 2569 | 4.226<br>(15.997) | 0.597<br>(0.363) | 11.69<br>(2.303) | 181<br>(82.6) | 57<br>(14.1) | 76<br>(24.4) | 29.040<br>(98.064) |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 8th (H1) Gear** | | | | | | | | | | | |
| 79.71<br>(59.44) | 5792<br>(25.76) | 5.16<br>(8.31) | 2401 | 4.36 | 6.059<br>(22.935) | 0.530<br>(0.322) | 13.16<br>(2.591) | 189<br>(87.2) | 63<br>(17.2) | 79<br>(26.1) | 28.910<br>(97.625) |
| **75% of Pull at Maximum Power—Ten Hours 8th (H1) Gear** | | | | | | | | | | | |
| [illegible]4.36<br>(47.99) | 4391<br>(19.53) | 5.50<br>(8.85) | 2529 | 3.37 | 5.227<br>(19.788) | 0.566<br>(0.345) | 12.31<br>(2.425) | 182<br>(83.1) | 63<br>(17.4) | 66<br>(18.7) | 28.699<br>(96.912) |
| **50% of Pull at Maximum Power—Two Hours 8th (H1) Gear** | | | | | | | | | | | |
| 43.83<br>(32.69) | 2928<br>(13.02) | 5.61<br>(9.03) | 2554 | 2.22 | 4.266<br>(16.150) | 0.679<br>(0.413) | 10.27<br>(2.024) | 179<br>(81.7) | 55<br>(12.5) | 61<br>(15.8) | 28.905<br>(97.608) |
| **50% of Pull at Reduced Engine Speed—Two Hours 12th (H4) Gear** | | | | | | | | | | | |
| 43.90<br>(32.74) | 2928<br>(13.02) | 5.62<br>(9.05) | 1696 | 2.26 | 3.209<br>(12.147) | 0.510<br>(0.310) | 13.68<br>(2.695) | 180<br>(82.2) | 56<br>(13.1) | 64<br>(17.5) | 28.955<br>(97.777) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 66.08<br>(49.27) | 11486<br>(51.09) | 2.16<br>(3.47) | 2518 | 14.79 | 4th (L4) Gear | | | 182<br>(83.3) | 54<br>(12.2) | 59<br>(15.0) | 28.880<br>(97.523) |
| 77.61<br>(57.87) | 8853<br>(39.38) | 3.29<br>(5.29) | 2401 | 7.86 | 5th (L5) Gear | | | 185<br>(84.7) | 62<br>(16.7) | 77<br>(25.0) | 28.970<br>(97.827) |
| 78.33<br>(58.41) | 7460<br>(33.18) | 3.94<br>(6.34) | 2400 | 6.09 | 6th (L6) Gear | | | 186<br>(85.6) | 62<br>(16.7) | 76<br>(24.4) | 28.970<br>(97.827) |
| 78.41<br>(58.47) | 6512<br>(28.96) | 4.52<br>(7.27) | 2400 | 5.04 | 7th (L7) Gear | | | 188<br>(86.4) | 61<br>(16.1) | 74<br>(23.3) | 28.950<br>(97.760) |
| 80.46<br>(60.00) | 5855<br>(26.04) | 5.15<br>(8.29) | 2399 | 4.46 | 8th (H1) Gear | | | 187<br>(86.1) | 60<br>(15.6) | 72<br>(22.2) | 28.930<br>(97.692) |
| 78.87<br>(58.81) | 5523<br>(24.57) | 5.36<br>(8.62) | 2398 | 4.18 | 9th (L8) Gear | | | 189<br>(87.2) | 62<br>(16.7) | 75<br>(23.9) | 28.960<br>(97.794) |
| 80.72<br>(60.19) | 4952<br>(22.03) | 6.11<br>(9.84) | 2401 | 3.67 | 10th (H2) Gear | | | 189<br>(87.2) | 62<br>(16.7) | 77<br>(25.0) | 28.970<br>(97.827) |
| 80.09<br>(59.72) | 4320<br>(19.21) | 6.95<br>(11.19) | 2400 | 3.15 | 11th (H3) Gear | | | 188<br>(86.4) | 62<br>(16.7) | 77<br>(25.0) | 28.950<br>(97.760) |
| 78.74<br>(58.71) | 3593<br>(15.98) | 8.22<br>(13.23) | 2399 | 2.56 | 12th (H4) Gear | | | 190<br>(87.8) | 62<br>(16.7) | 78<br>(25.6) | 28.940<br>(97.726) |

**Department of Agricultural Engineering**

**Dates of Test:** June 4-11, 1982

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** CD/SE **To motor** 2.492 gal *(9.432 l)* **Drained from motor** 2.544 gal *(9.629 l)* **Transmission and final drive lubricant** I.H. Hytran fluid **Total time engine was operated** 38.5 hours.

**ENGINE: Make** International Diesel **Type** six cylinder vertical **Serial No.** 358DT2D110636* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.875" × 5.062" *(98.4 mm × 128.6 mm)* **Compression ratio** 14.8 to 1 **Displacement** 358 cu in *(5866 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard with duals **Serial No.** 252000 2U001085* **Tread width** rear 66" *(1676 mm)* to 113.5" *(2883 mm)* front 60" *(1524 mm)* to 84" *(2134 mm)* **Wheel base** 104.8" *(2662 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.0" *(711 mm)* Vertical distance above roadway 38.3" *(973 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 1.5 *(2.4)* second 1.8 *(2.9)* third 2.0 *(3.2)* fourth 2.4 *(3.8)* fifth 3.5 *(5.6)* sixth 4.1 *(6.6)* seventh 4.7 *(7.5)* eighth 5.3 *(8.5)* ninth 5.5 *(8.8)* tenth 6.2 *(10.0)* eleventh 7.0 *(11.3)* twelfth 8.3 *(13.3)* thirteenth 12.2 *(19.6)* fourteenth 14.3 *(23.1)* fifteenth 16.3 *(26.2)* sixteenth 19.1 *(30.8)* reverse 2.6 *(4.2)*, 3.1 *(4.9)*, 3.5 *(5.6)*, 4.1 *(6.5)* 6.0 *(9.7)* 7.0 *(11.3)* 8.0 *(12.9)* 9.4 *(15.1)* **Clutch** single dry disc hydraulically power actuated and operated by foot pedal **Brakes** wet multiple disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 142.8" *(3.63 m)* left 142.8" *(3.63 m)* (on concrete surface without brake) right 174.6" *(4.43 m)* left 174.6" *(4.43 m)* **Turning space diameter** (on concrete surface with brake applied) right 301.4" *(7.66 m)* left 301.4" *(7.66 m)* (on concrete surface without brake) right 365.2" *(9.28 m)* left 365.2" *(9.28 m)* **Power take-off** 540 rpm at 2106 engine rpm and 1000 rpm at 2071 engine rpm.

### LUGGING ABILITY IN 8th (H1) GEAR

| Crankshaft Speed rpm | 2399 | 2161 | 1920 | 1681 | 1440 | 1202 | 957 |
|---|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 5855<br>(26.04) | 6400<br>(28.47) | 6838<br>(30.42) | 7111<br>(31.63) | 7148<br>(31.80) | 7199<br>(32.02) | 7183<br>(31.95) |
| Increase in Pull % | 0 | 9 | 17 | 21 | 22 | 23 | 23 |
| Power—Hp (kW) | 80.46<br>(60.00) | 78.84<br>(58.79) | 74.51<br>(55.56) | 67.61<br>(50.41) | 58.14<br>(43.35) | 48.84<br>(36.42) | 38.79<br>(28.92) |
| Speed—Mph (km/h) | 5.15<br>(8.29) | 4.62<br>(7.43) | 4.09<br>(6.58) | 3.57<br>(5.74) | 3.05<br>(4.91) | 2.54<br>(4.09) | 2.03<br>(3.26) |
| Slip % | 4.46 | 4.96 | 5.39 | 5.67 | 5.81 | 5.81 | 5.95 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 79.0 |
| 75% of Pull at Maximum Power—Ten Hours | 80.5 |
| 50% of Pull at Maximum Power—Two Hours | 80.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 77.0 |
| Bystander in 15th (H7) gear | 86.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Four 18.4-34; 6; 12 *(85)* | Four 18.4-34; 6; 12 *(85)* |
| Ballast | —Liquid (each inner) | 568 lb *(258 kg)* | None |
| | —Test Equip (each) | 100 lb *(45 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 9.5L-15; 6; 36 *(250)* | Two 9.5L-15; 6; 36 *(250)* |
| Ballast | —Test Equip (each) | 87 lb *(40 kg)* | None |
| | —Cast Iron (each) | 45 lb *(20 kg)* | None |
| Height of Drawbar | | 19 in *(485 mm)* | 19 in *(485 mm)* |
| Static Weight with Operator—Rear | | 10155 lb *(4606 kg)* | 8620 lb *(3910 kg)* |
| —Front | | 3405 lb *(1545 kg)* | 3140 lb *(1424 kg)* |
| —Total | | 13560 lb *(6151 kg)* | 11760 lb *(5334 kg)* |

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. During inspection light pitting on the exhaust valves of cylinders 5 and 6 was found. For the maximum power tests, the fuel temperature at the injection pump was maintained at 118°F *(47.8°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1438.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**International 3288 Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Kleis, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1439 — INTERNATIONAL 3488 HYDRO DIESEL HYDROSTATIC

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1156 rpm)** | | | | | | | | |
| 112.56<br>(83.94) | 2400 | 7.971<br>(30.174) | 0.494<br>(0.300) | 14.12<br>(2.782) | 196<br>(91.1) | 59<br>(15.1) | 75<br>(23.8) | 29.030<br>(98.090) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 107.11<br>(79.87) | 2072 | 7.008<br>(26.528) | 0.456<br>(0.278) | 15.28<br>(3.011) | 197<br>(91.4) | 59<br>(15.1) | 75<br>(23.7) | 29.050<br>(98.090) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 99.31<br>(74.06) | 2490 | 7.348<br>(27.815) | 0.516<br>(0.314) | 13.51<br>(2.663) | 192<br>(88.6) | 60<br>(15.3) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2623 | 3.278<br>(12.409) | .....<br>..... | .....<br>..... | 169<br>(76.1) | 58<br>(14.7) | 74<br>(23.6) | ......<br>...... |
| 50.97<br>(38.01) | 2562 | 5.195<br>(19.698) | 0.710<br>(0.432) | 9.82<br>(1.934) | 178<br>(81.1) | 59<br>(15.0) | 75<br>(23.9) | ......<br>...... |
| 113.18<br>(84.40) | 2400 | 8.020<br>(30.359) | 0.494<br>(0.301) | 14.11<br>(2.780) | 196<br>(90.8) | 59<br>(15.0) | 76<br>(24.4) | ......<br>...... |
| 25.96<br>(19.37) | 2598 | 4.229<br>(16.009) | 1.155<br>(0.691) | 6.14<br>(1.210) | 176<br>(79.7) | 58<br>(14.7) | 74<br>(23.6) | ......<br>...... |
| 75.62<br>(56.39) | 2530 | 6.238<br>(23.613) | 0.575<br>(0.350) | 12.12<br>(2.388) | 184<br>(84.2) | 59<br>(15.0) | 76<br>(24.2) | ......<br>...... |
| Av 60.84<br>Av (45.37) | 2534 | 5.718<br>(21.645) | 0.656<br>(0.399) | 10.64<br>(2.096) | 182<br>(83.4) | 59<br>(14.9) | 75<br>(23.9) | 29.050<br>(98.098) |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours, Speed Setting—[illegible] MPH Hi Range** | | | | | | | | | | | |
| 80.50<br>(60.03) | 4848<br>(21.56) | 6.23<br>(10.02) | 2399 | 3.01 | 8.049<br>(30.468) | 0.667<br>(0.424) | 10.00<br>(1.970) | 197<br>(91.4) | 60<br>(15.6) | 70<br>(21.1) | 28.970<br>(97.827) |
| **75% of Pull at Maximum Power—Ten Hours, Speed Setting—6.20 MPH Hi Range** | | | | | | | | | | | |
| 69.15<br>(51.56) | 3761<br>(16.73) | 6.89<br>(11.10) | 2514 | 2.25[1] | 7.106<br>(26.899) | 0.717<br>(0.436) | 9.73<br>(1.917) | 188<br>(86.7) | 62<br>(16.7) | 70<br>(20.9) | 28.938<br>(97.719) |
| **50% of Pull at Maximum Power—Two Hours, Speed Setting—6.20 MPH Hi Range** | | | | | | | | | | | |
| 50.15<br>(37.40) | 2507<br>(11.15) | 7.50<br>(12.07) | 2558 | 1.45 | 5.952<br>(22.529) | 0.827<br>(0.503) | 8.43<br>(1.660) | 186<br>(85.6) | 61<br>(15.8) | 74<br>(23.1) | 28.960<br>(97.794) |
| **50% of Pull at Reduced Engine Speed—Two Hours, Speed Setting—9.55 MPH Hi Range at 2400 Engine RPM** | | | | | | | | | | | |
| 50.17<br>(37.41) | 2507<br>(11.15) | 7.50<br>(12.08) | 1720 | 1.41 | 5.127<br>(19.407) | 0.713<br>(0.433) | 9.79<br>(1.928) | 198<br>(91.9) | 62<br>(16.4) | 76<br>(24.2) | 28.915<br>(97.642) |
| **MAXIMUM POWER AT SELECTED SPEEDS** | | | | | | | | | | | |
| 75.59<br>(56.37) | 12152<br>(54.05) | 2.33<br>(3.75) | 2400 | 14.62 | The infinitely | Lo R. | | 185<br>(84.7) | 57<br>(13.9) | 61<br>(16.1) | 28.970<br>(97.827) |
| 77.28<br>(57.63) | 7130<br>(31.71) | 4.06<br>(6.54) | 2401 | 4.71 | variable drive | Lo R. | | 202<br>(94.2) | 59<br>(15.0) | 77<br>(25.0) | 29.040<br>(98.064) |
| 75.65<br>(56.41) | 6252<br>(27.81) | 4.54<br>(7.30) | 2400 | 4.02 | control was | Lo R. | | 203<br>(94.7) | 59<br>(15.0) | 77<br>(25.0) | 29.040<br>(98.064) |
| 75.55<br>(56.34) | 5663<br>(25.19) | 5.00<br>(8.05) | 2399 | 3.48 | set to give | Lo R. | | 201<br>(93.6) | 59<br>(15.3) | 77<br>(25.0) | 29.040<br>(98.064) |
| 76.62<br>(57.14) | 5242<br>(23.32) | 5.48<br>(8.82) | 2402 | 3.17 | the travel | Hi R. | | 202<br>(94.4) | 59<br>(15.0) | 77<br>(25.0) | 29.050<br>(98.097) |
| 80.06<br>(59.70) | 4977<br>(22.14) | 6.03<br>(9.71) | 2401 | 3.01 | speeds shown | Hi R. | | 190<br>(87.8) | 59<br>(15.0) | 75<br>(23.9) | 29.030<br>(98.097) |
| 82.90<br>(61.82) | 5014<br>(22.30) | 6.20<br>(9.98) | 2401 | 3.25 | | Hi R. | | 195<br>(90.6) | 58<br>(14.4) | 66<br>(18.9) | 28.980<br>(97.861) |
| 83.43<br>(62.21) | 4815<br>(21.42) | 6.50<br>(10.46) | 2401 | 2.85 | | Hi R. | | 198<br>(92.2) | 57<br>(13.9) | 73<br>(22.8) | 29.070<br>(98.165) |
| 82.65<br>(61.63) | 4357<br>(19.38) | 7.11<br>(11.45) | 2400 | 2.62 | | Hi R. | | 204<br>(95.6) | 60<br>(15.6) | 78<br>(25.6) | 29.020<br>(97.996) |
| 82.85<br>(61.78) | 4130<br>(18.37) | 7.52<br>(12.11) | 2400 | 2.46 | | Hi R. | | 200<br>(93.3) | 58<br>(14.4) | 74<br>(23.3) | 29.060<br>(98.131) |
| 81.66<br>(60.89) | 3745<br>(16.66) | 8.18<br>(13.16) | 2399 | 2.14 | | Hi R. | | 201<br>(93.9) | 58<br>(14.4) | 74<br>(23.3) | 29.060<br>(98.131) |

**Department of Agricultural Engineering**

**Dates of Test:** June 8-14, 1982

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** CD/SE **To motor** 3.008 gal *(11.395 l)* **Drained from motor** 2.395 gal *(9.066 l)* **Transmission and final drive lubricant** I.H. Hytran fluid **Total time engine was operated** 51.0 hours.

**ENGINE: Make** International Diesel **Type** six cylinder vertical **Serial No.** 466DT2U055252* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.30" × 5.35" *(109.2 mm × 135.9 mm)* **Compression ratio** 15.7 to 1 **Displacement** 466 cu in *(7636 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard with duals **Serial No.** 2560002U000698* **Tread width** rear 66" *(1680 mm)* to 114.5" *(2910 mm)* front 60" *(1524 mm)* to 84" *(2134 mm)* **Wheel base** 104.8" *(2662 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.0" *(711 mm)* Vertical distance above roadway 40.7" *(1034 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** infinitely variable hydrostatic using variable displacement pump and motor. A range transmission provides Hi and Lo range **Advertised speeds mph (km/h)** Lo Range—0 to 8.0 *(12.8)*; Hi Range—0 to 17.8 *(28.7)*; reverse Lo Range—0 to 3.0 *(4.8)*, Hi Range—0 to 7.4 *(11.9)* **Clutch** none-hydrostatic drive can be controlled by foot pedal **Brakes** wet multiple disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 141" *(3.58 m)* left 141" *(3.58 m)* (on concrete surface without brake) right 172" *(4.37 m)* left 172" *(4.37 m)* **Turning space diameter** (on concrete surface with brake applied) right 291" *(7.39 m)* left 291" *(7.39 m)* (on concrete surface without brake) right 354" *(8.99 m)* left 354" *(8.99 m)* **Power take-off** 540 rpm at 2106 engine rpm and 1000 rpm at 2072 engine rpm.

**REPAIRS and ADJUSTMENTS:** The fuel line to number two injector was replaced during preliminary PTO tests.

## LUGGING ABILITY FROM SPEED SETTING—6.20 MPH Hi Range

| Crankshaft Speed rpm | 2401 | 2157 | 1921 | 1682 | 1459 | 1200 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 5014<br>(22.30) | 5451<br>(24.25) | 5662<br>(25.19) | 5902<br>(26.25) | 6126<br>(27.25) | 5941<br>(26.43) |
| Increase in Pull % | 0 | 9 | 13 | 18 | 22 | 18 |
| Power—Hp<br>(kW) | 82.90<br>(61.82) | 78.53<br>(58.56) | 70.56<br>(52.62) | 61.60<br>(45.94) | 50.82<br>(37.90) | 38.96<br>(29.05) |
| Speed—Mph<br>(km/h) | 6.20<br>(9.98) | 5.40<br>(8.69) | 4.67<br>(7.52) | 3.91<br>(6.30) | 3.11<br>(5.01) | 2.46<br>(3.96) |
| Slip % | 3.25 | 3.56 | 3.71 | 3.87 | 4.02 | 4.02 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 83.5 |
| 75% of Pull at Maximum Power—Ten Hours | 86.5 |
| 50% of Pull at Maximum Power—Two Hours | 85.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 82.0 |
| Bystander in Hi Range | 89.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Inner Two 18.4-38; 8; 12 (83)<br>Outer Two 18.4-38; 6; 12 (83) | Inner Two 18.4-38; 8; 12 (83)<br>Outer Two 18.4-38;6; 12 (83) |
| Ballast | —Liquid (each inner) | 250 lb (114 kg) | None |
| | —Test Equip (each) | 75 lb (34 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 11L-15; 6; 32 (220) | Two 11L-15; 6; 32 (220) |
| Ballast | —Test Equip (each) | 85 lb ([illegible]) | None |
| | —Cast Iron (each) | 45 lb (20 kg) | None |
| Height of Drawbar | | 21.5 in (545 mm) | 21.5 in (545 mm) |
| Static Weight with Operator | —Rear | 10160 lb (4608 kg) | 9360 lb (4245 kg) |
| | —Front | 3780 lb (1715 kg) | 3520 lb (1597 kg) |
| | —Total | 13940 lb (6323 kg) | 12880 lb (5842 kg) |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 175°F *(78.3°C)*. Eleven travel speeds were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1439**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**International 3488 Hydro Diesel**

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Klein, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1440 — INTERNATIONAL 3688 DIESEL 16 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1150 rpm)** | | | | | | | | |
| 113.72<br>(84.80) | 2400 | 7.551<br>(28.580) | 0.402<br>(0.245) | 15.10<br>(2.975) | 191<br>(88.4) | 57<br>(13.9) | 75<br>(24.0) | 28.943<br>(97.737) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 112.40<br>(83.82) | 2071 | 7.143<br>(27.039) | 0.443<br>(0.269) | 15.75<br>(3.102) | 195<br>(90.3) | 57<br>(13.8) | 75<br>(23.8) | 28.930<br>(97.692) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 99.71<br>(74.35) | 2470 | 6.811<br>(25.782) | 0.476<br>(0.290) | 14.64<br>(2.884) | 186<br>(85.6) | 57<br>(13.9) | 76<br>(24.2) | ...... |
| 0.00<br>(0.00) | 2610 | 2.715<br>(10.277) | ..... | ..... | 169<br>(76.1) | 56<br>(13.6) | 74<br>(23.1) | ...... |
| 51.42<br>(38.34) | 2556 | 4.656<br>(17.621) | 0.631<br>(0.384) | 11.05<br>(2.176) | 176<br>(79.7) | 56<br>(13.6) | 74<br>(23.6) | ...... |
| 113.83<br>(84.88) | 2401 | 7.551<br>(28.584) | 0.463<br>(0.281) | 15.08<br>(2.969) | 190<br>(88.1) | 57<br>(13.9) | 74<br>(23.6) | ...... |
| 26.16<br>(19.51) | 2566 | 3.653<br>(13.828) | 0.974<br>(0.592) | 7.16<br>(1.411) | 172<br>(77.5) | 58<br>(14.4) | 76<br>(24.7) | ...... |
| 76.21<br>(56.83) | 2521 | 5.696<br>(21.562) | 0.521<br>(0.317) | 13.38<br>(2.636) | 180<br>(81.9) | 58<br>(14.2) | 76<br>(24.2) | ...... |
| Av 61.22<br>Av (45.65) | 2521 | 5.100<br>(19.306) | 0.590<br>(0.359) | 11.82<br>(2.328) | 179<br>(81.4) | 57<br>(13.9) | 75<br>(23.9) | 28.900<br>(97.597) |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 8th (H1) Gear** | | | | | | | | | | | |
| 99.21<br>(73.98) | 6813<br>(30.31) | 5.46<br>(8.79) | 2400 | 4.81 | 7.457<br>(28.229) | 0.524<br>(0.319) | 13.30<br>(2.621) | 183<br>(83.9) | 51<br>(10.3) | 59<br>(14.7) | 28.930<br>(97.692) |
| **75% of Pull at Maximum Power—Ten Hours 8th (H1) Gear** | | | | | | | | | | | |
| 78.92<br>(58.85) | 5157<br>(22.94) | 5.74<br>(9.24) | 2491 | 3.55 | 6.393<br>(24.190) | 0.565<br>(0.344) | 12.35<br>(2.432) | 180<br>(82.0) | 57<br>(13.8) | 62<br>(16.8) | 28.887<br>(97.547) |
| **50% of Pull at Maximum Power—Two Hours 8th (H1) Gear** | | | | | | | | | | | |
| 54.16<br>(40.39) | 3438<br>(15.29) | 5.91<br>(9.51) | 2556 | 2.44 | 5.217<br>(19.747) | 0.672<br>(0.409) | 10.38<br>(2.045) | 175<br>(79.4) | 54<br>(11.9) | 60<br>(15.3) | 28.985<br>(97.878) |
| **50% of Pull at Reduced Engine Speed—Two Hours 12th (H4) Gear** | | | | | | | | | | | |
| 54.20<br>(40.41) | 3438<br>(15.29) | 5.91<br>(9.51) | 1622 | 2.44 | 3.818<br>(14.454) | 0.491<br>(0.299) | 14.19<br>(2.796) | 177<br>(80.6) | 56<br>(13.3) | 64<br>(17.5) | 28.985<br>(97.878) |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 73.52<br>(54.82) | 12250<br>(54.49) | 2.25<br>(3.62) | 2476 | 14.90 | 4th (L4) Gear | 175<br>(79.4) | 53<br>(11.7) | 57<br>(13.9) | 28.970<br>(97.827) |
| 96.23<br>(71.76) | 10391<br>(46.22) | 3.47<br>(5.59) | 2401 | 8.38 | 5th (L5) Gear | 181<br>(82.5) | 51<br>(10.6) | 60<br>(15.6) | 28.930<br>(97.692) |
| 97.47<br>(72.68) | 8766<br>(38.99) | 4.17<br>(6.71) | 2400 | 6.37 | 6th (L6) Gear | 183<br>(83.6) | 51<br>(10.6) | 60<br>(15.6) | 28.930<br>(97.692) |
| 97.51<br>(72.72) | 7648<br>(34.02) | 4.78<br>(7.70) | 2400 | 5.35 | 7th (L7) Gear | 183<br>(83.9) | 51<br>(10.6) | 60<br>(15.6) | 28.930<br>(97.692) |
| 100.12<br>(74.66) | 6876<br>(30.58) | 5.46<br>(8.79) | 2400 | 4.61 | 8th (H1) Gear | 183<br>(83.6) | 50<br>(10.0) | 58<br>(14.4) | 28.920<br>(97.659) |
| 99.06<br>(73.87) | 6552<br>(29.14) | 5.67<br>(9.13) | 2400 | 4.80 | 9th (L8) Gear | 183<br>(83.9) | 51<br>(10.6) | 60<br>(15.6) | 28.930<br>(97.692) |
| 99.76<br>(74.39) | 5778<br>(25.70) | 6.47<br>(10.42) | 2401 | 3.97 | 10th (H2) Gear | 183<br>(83.6) | 51<br>(10.6) | 60<br>(15.6) | 28.930<br>(97.692) |
| 100.20<br>(74.70) | 5111<br>(22.73) | 7.35<br>(11.84) | 2400 | 3.42 | 11th (H3) Gear | 184<br>(84.2) | 51<br>(10.6) | 59<br>(15.0) | 28.930<br>(97.692) |
| 99.37<br>(74.10) | 4281<br>(19.04) | 8.70<br>(14.01) | 2401 | 2.80 | 12th (H4) Gear | 183<br>(83.9) | 51<br>(10.6) | 59<br>(15.0) | 28.930<br>(97.692) |

**Department of Agricultural Engineering**

**Dates of Test:** May 26 to June 7, 1982

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** CD/SE **To motor** 2.722 gal *(10.302 l)* **Drained from motor** 2.129 gal *(8.058 l)* **Transmission and final drive lubricant** I.H. Hytran fluid **Total time engine was operated** 46.0 hours.

**ENGINE:** **Make** International Diesel **Type** six cylinder vertical **Serial No.** 436DT2U092915* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.30" × 5.00" *(109.2 mm × 127 mm)* **Compression ratio** 16 to 1 **Displacement** 436 cu in *(7145 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard with duals **Serial No.** 2530002U001879* **Tread width** rear 66" *(1676 mm)* to 128.5" *(3264 mm)* front 60" *(1524 mm)* to 84" *(2134 mm)* **Wheel base** 104.8" *(2662 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.5" *(699 mm)* Vertical distance above roadway 40.5" *(1029 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.6 *(2.6)* second 1.9 *(3.1)* third 2.2 *(3.5)* fourth 2.5 *(4.1)* fifth 3.7 *(6.0)* sixth 4.4 *(7.0)* seventh 5.0 *(8.0)* eighth 5.6 *(9.1)* ninth 5.8 *(9.4)* tenth 6.6 *(10.7)* eleventh 7.5 *(12.1)* twelfth 8.8 *(14.2)* thirteenth 13.0 *(20.9)* fourteenth 15.3 *(24.6)* fifteenth 17.4 *(28.0)* sixteenth 20.4 *(32.9)* reverse 2.8 *(4.5)*, 3.3 *(5.3)*, 3.7 *(5.9)*, 4.3 *(7.0)*, 6.4 *(10.3)*, 7.5 *(12.1)*, 8.5 *(13.7)*, 10.0 *(16.2)* **Clutch** single plate dry disc operated by foot pedal with hydraulic power assist **Brakes** wet multiple disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 141" *(3.58 m)* left 141" *(3.58 m)* (on concrete surface without brake) right 172" *(4.37 m)* left 172" *(4.37 m)* **Turning space diameter** (on concrete surface with brake applied) right 291" *(7.39 m)* left 291" *(7.39 m)* (on concrete surface without brake) right 354" *(8.99 m)* left 354" *(8.99 m)* **Power take-off** 540 rpm at 2106 engine rpm and 1000 rpm at 2071 engine rpm.

## LUGGING ABILITY IN 8th (H1) GEAR

| Crankshaft Speed rpm | 2400 | 2161 | 1925 | 1679 | 1447 | 1197 |
|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 6876<br>(30.58) | 7736<br>(34.41) | 8350<br>(37.14) | 8708<br>(38.74) | 8704<br>(38.72) | 8463<br>(37.65) |
| Increase in Pull % | 0 | 13 | 21 | 27 | 27 | 23 |
| Power—Hp (kW) | 100.12<br>(74.66) | 100.73<br>(75.11) | 96.32<br>(71.83) | 87.28<br>(65.09) | 75.14<br>(56.03) | 60.56<br>(45.15) |
| Speed—Mph (km/h) | 5.46<br>(8.79) | 4.88<br>(7.86) | 4.33<br>(6.96) | 3.76<br>(6.05) | 3.24<br>(5.21) | 2.68<br>(4.32) |
| Slip % | 4.61 | 5.41 | 5.86 | 6.30 | 6.45 | 6.30 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 80.5 |
| 75% of Pull at Maximum Power—Ten Hours | 82.5 |
| 50% of Pull at Maximum Power—Two Hours | 80.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 77.0 |
| Bystander in 15th (H7) gear | 80.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Inner Two 18.4-38; 8; 12 (83)<br>Outer Two 18.4-38; 6; 12 (83) | Inner Two 18.4-38; 8; 12 (83)<br>Outer Two 18.4-38; 6; 12 (83) |
| Ballast | —Liquid (each inner) | 250 lb (114 kg) | None |
| | —Tire Equip. (each) | 95 lb (43 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 11L-15; 6; 32 (220) | Two 11L-15; 6; 32 (220) |
| Ballast | —Tire Equip (each) | 82 lb (37 kg) | None |
| | —Cast Iron (each) | 45 lb (20 kg) | None |
| Height of Drawbar | | 21.5 in (545 mm) | 21.5 in (545 mm) |
| Static Weight with Operator—Rear | | 10610 lb (4813 kg) | 9730 lb (4414 kg) |
| —Front | | 3725 lb (1690 kg) | 3470 lb (1574 kg) |
| —Total | | 14335 lb (6502 kg) | 13200 lb (5988 kg) |

International 3688 Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests the fuel temperature at the injection pump was maintained at 125°F *(50.6°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1440.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Robert W. Klein, Acting Dean and Director

# NEBRASKA TRACTOR TEST 1441 — INTERNATIONAL 5488 DIESEL
## 18 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1005 rpm)** | | | | | | | | |
| 187.22<br>*(139.61)* | 2400 | 11.555<br>*(43.740)* | 0.450<br>*(0.262)* | 16.20<br>*(3.192)* | 190<br>*(87.7)* | 61<br>*(15.9)* | 75<br>*(23.9)* | 28.873<br>*(97.501)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 165.46<br>*(123.38)* | 2496 | 10.665<br>*(40.371)* | 0.449<br>*(0.273)* | 15.51<br>*(3.056)* | 186<br>*(85.6)* | 61<br>*(16.1)* | 76<br>*(24.4)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2614 | 3.446<br>*(13.045)* | .....<br>..... | .....<br>..... | 176<br>*(80.0)* | 60<br>*(15.6)* | 74<br>*(23.3)* | ......<br>...... |
| 84.88<br>*(63.30)* | 2556 | 6.935<br>*(26.252)* | 0.570<br>*(0.347)* | 12.24<br>*(2.411)* | 180<br>*(82.2)* | 60<br>*(15.6)* | 74<br>*(23.3)* | ......<br>...... |
| 186.88<br>*(139.36)* | 2400 | 11.517<br>*(43.597)* | 0.450<br>*(0.261)* | 16.23<br>*(3.197)* | 189<br>*(87.2)* | 60<br>*(15.8)* | 75<br>*(23.9)* | ......<br>...... |
| 42.84<br>*(31.95)* | 2590 | 5.184<br>*(19.624)* | 0.844<br>*(0.513)* | 8.26<br>*(1.628)* | 177<br>*(80.6)* | 60<br>*(15.6)* | 74<br>*(23.6)* | ......<br>...... |
| 125.58<br>*(93.64)* | 2524 | 8.841<br>*(33.467)* | 0.491<br>*(0.299)* | 14.20<br>*(2.798)* | 183<br>*(83.9)* | 61<br>*(16.1)* | 75<br>*(23.9)* | ......<br>...... |
| **Av** 100.94<br>*Av (75.27)* | 2530 | 7.765<br>*(29.394)* | 0.536<br>*(0.326)* | 13.00<br>*(2.561)* | 182<br>*(83.3)* | 60<br>*(15.8)* | 75<br>*(23.8)* | 28.897<br>*(97.580)* |

### DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 163.44<br>*(121.88)* | 11642<br>*(51.78)* | 5.26<br>*(8.47)* | 2399 | 3.69 | 11.545<br>*(43.701)* | 0.493<br>*(0.300)* | 14.16<br>*(2.789)* | 187<br>*(85.8)* | 55<br>*(12.5)* | 67<br>*(19.2)* | 28.915<br>*(97.642)* |
| **75% of Pull at Maximum Power—Ten Hours 9th (M3) Gear** | | | | | | | | | | | |
| 130.87<br>*(97.59)* | 8798<br>*(39.14)* | 5.58<br>*(8.98)* | 2512 | 2.57 | 9.949<br>*(37.661)* | 0.530<br>*(0.322)* | 13.15<br>*(2.591)* | 182<br>*(83.4)* | 56<br>*(13.6)* | 66<br>*(18.8)* | 28.951<br>*(97.763)* |
| **50% of Pull at Maximum Power—Two Hours 9th (M3) Gear** | | | | | | | | | | | |
| 89.26<br>*(66.56)* | 5866<br>*(26.09)* | 5.71<br>*(9.18)* | 2549 | 1.76 | 7.959<br>*(30.129)* | 0.622<br>*(0.378)* | 11.21<br>*(2.209)* | 179<br>*(81.7)* | 57<br>*(13.9)* | 60<br>*(15.6)* | 28.945<br>*(97.743)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 13th (H1) Gear** | | | | | | | | | | | |
| 89.32<br>*(66.60)* | 5866<br>*(26.09)* | 5.71<br>*(9.19)* | 1530 | 1.58 | 6.023<br>*(22.800)* | 0.470<br>*(0.286)* | 14.83<br>*(2.921)* | 181<br>*(82.8)* | 59<br>*(15.0)* | 64<br>*(17.8)* | 28.893<br>*(97.574)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 154.52<br>*(115.23)* | 18646<br>*(82.94)* | 3.11<br>*(5.00)* | 2400 | 8.93 | 6th (L6) Gear | | | 181<br>*(82.5)* | 56<br>*(13.3)* | 58<br>*(14.4)* | 28.940<br>*(97.726)* |
| 162.73<br>*(121.35)* | 16001<br>*(71.18)* | 3.81<br>*(6.14)* | 2400 | 6.06 | 7th (M1) Gear | | | 185<br>*(85.0)* | 52<br>*(11.1)* | 63<br>*(17.2)* | 28.940<br>*(97.726)* |
| 164.58<br>*(122.73)* | 13535<br>*(60.21)* | 4.56<br>*(7.34)* | 2400 | 4.35 | 8th (M2) Gear | | | 186<br>*(85.3)* | 52<br>*(11.1)* | 62<br>*(16.7)* | 28.940<br>*(97.726)* |
| 164.82<br>*(122.91)* | 11731<br>*(52.18)* | 5.27<br>*(8.48)* | 2398 | 3.52 | 9th (M3) Gear | | | 186<br>*(85.6)* | 53<br>*(11.7)* | 60<br>*(15.6)* | 28.970<br>*(97.827)* |
| 164.43<br>*(122.61)* | 9879<br>*(43.94)* | 6.24<br>*(10.04)* | 2401 | 2.92 | 10th (M4) Gear | | | 186<br>*(85.6)* | 52<br>*(11.1)* | 63<br>*(17.2)* | 28.940<br>*(97.726)* |
| 162.54<br>*(121.21)* | 8373<br>*(37.24)* | 7.28<br>*(11.72)* | 2400 | 2.41 | 11th (M5) Gear | | | 188<br>*(86.4)* | 52<br>*(11.1)* | 64<br>*(17.8)* | 28.940<br>*(97.726)* |
| 160.12<br>*(119.40)* | 6987<br>*(31.08)* | 8.59<br>*(13.83)* | 2400 | 1.80 | 12th (M6) Gear | | | 187<br>*(86.1)* | 52<br>*(11.1)* | 64<br>*(17.8)* | 28.940<br>*(97.726)* |

### LUGGING ABILITY IN 9th (M3) GEAR

| Crankshaft Speed rpm | 2398 | 2102 | 1919 | 1682 | 1441 | 1204 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 11731<br>*(52.18)* | 13488<br>*(60.00)* | 14928<br>*(66.40)* | 15838<br>*(70.45)* | 15477<br>*(68.85)* | 13385<br>*(59.54)* |
| Increase in Pull % | 0 | 15 | 27 | 35 | 32 | 14 |
| Power—Hp<br>*(kW)* | 164.82<br>*(122.91)* | 169.56<br>*(126.44)* | 165.14<br>*(123.14)* | 152.46<br>*(113.69)* | 127.90<br>*(95.37)* | 93.55<br>*(69.76)* |
| Speed—Mph<br>*(km/h)* | 5.27<br>*(8.48)* | 4.71<br>*(7.59)* | 4.15<br>*(6.68)* | 3.61<br>*(5.81)* | 3.10<br>*(4.99)* | 2.62<br>*(4.22)* |
| Slip % | 3.52 | 4.36 | 5.18 | 5.66 | 5.50 | 4.52 |

**Department of Agricultural Engineering**

**Dates of Test:** May 26 to June 8, 1982

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** CD/SE **To motor** 4.032 gal *(15.262 l)* **Drained from motor** 3.722 gal *(14.088 l)* **Transmission and final drive lubricant** I.H. Hy-tran fluid **Total time engine was operated** 38.5 hours.

**ENGINE:** **Make** International Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 467BT2U169510* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.30" × 5.35" *(109.2 mm × 13[illegible] mm)* **Compression ratio** 16.3 to 1 **Displacement** 466 cu in *(7636 ml)* **Starting system** 12 volt **Lubrication pressure** **Air cleaner** two paper elements with aspirator **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** standard with duals **Serial No.** 2590002U001019* **Tread width** rear 64" *(1625 mm)* to 130" *(3302 mm)* front 62.5" *(1588 mm)* to 86.5" *(2197 mm)* **Wheel base** 111.6" *(2835 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 26.9" *(683 mm)* Vertical distance above roadway 38.9" *(988 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph (km/h)** first 1.5 *(2.4)* second 1.8 *(2.8)* third 2.0 *(3.2)* fourth 2.4 *(3.8)* fifth 2.7 *(4.4)* sixth 3.2 *(5.2)* seventh 3.8 *(6.1)* eighth 4.5 *(7.2)* ninth 5.1 *(8.3)* tenth 6.0 *(9.7)* eleventh 7.0 *(11.3)* twelfth 8.2 *(13.3)* thirteenth 8.6 *(13.8)* fourteenth 10.1 *(16.2)* fifteenth 11.5 *(18.5)* sixteenth 13.6 *(21.8)* seventeenth 15.7 *(25.3)* eighteenth 18.5 *(29.7)* reverse 2.9 *(4.6)*, 3.4 *(5.4)*, 3.9 *(6.2)*, 4.5 *(7.3)*, 5.3 *(8.5)*, 6.2 *(9.9)* **Clutch** wet multiple disc operated by foot pedal with hydraulic power assist **Brakes** wet multiple disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 151.1" *(3.84 m)* left 151.1" *(3.84 m)* (on concrete surface without brake) right 199.5" *(5.07 m)* left 199.5" *(5.07 m)* **Turning space diameter** (on concrete surface with brake applied) right 316" *(8.03 m)* left 316" *(8.03 m)* (on concrete surface without brake) right 412" *(10.47 m)* left 412" *(10.47 m)* **Power take-off** 1005 rpm at 2400 engine rpm.

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 78.0 |
| 75% of Pull at Maximum Power—Ten Hours | 78.5 |
| 50% of Pull at Maximum Power—Two Hours | 77.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 73.0 |
| Bystander in 17th (H5) gear | 86.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Inner Two 20.8R38; 10; 12 *(85)*<br>Outer Two 20.8R38; 8; 12 *(85)* | Inner Two 20.8R38; 10; 12 *(85)*<br>Outer Two 20.8R38; 8; 12 *(85)* |
| **Ballast** | —Liquid (each inner) | 995 lb *(452 kg)* | None |
| | —Tire Equip. (each) | 108 lb *(49 kg)* | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 14L-16.1; 6; 28 *(195)* | Two 14L-16.1; 6; 28 *(195)* |
| **Ballast** | —Tire Equip (each) | 130 lb *(59 kg)* | None |
| | —Cast Iron (each) | 40 lb *(18 kg)* | None |
| **Height of Drawbar** | | 21.5 in *(545 mm)* | 21.5 in *(545 mm)* |
| **Static Weight with Operator** | —Rear | 15510 lb *(7035 kg)* | 13085 lb *(5935 kg)* |
| | —Front | 4495 lb *(2039 kg)* | 4155 lb *(1885 kg)* |
| | —Total | 20005 lb *(9074 kg)* | 17240 lb *(7820 kg)* |

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 128°F *(53.3°C)*. Seven gears were chosen between stability limit and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1441**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**International 5488 Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1442 — YANMAR YM226D DIESEL
# ALSO YANMAR YM226 DIESEL
# 9 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—583 rpm)** | | | | | | | | |
| 19.42<br>*(14.48)* | 2600 | 1.317<br>*(4.985)* | 0.473<br>*(0.288)* | 14.74<br>*(2.905)* | 187<br>*(86.1)* | 62<br>*(16.4)* | 76<br>*(24.2)* | 28.963<br>*(97.805)* |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 17.87<br>*(13.33)* | 2409 | 1.186<br>*(4.489)* | 0.463<br>*(0.282)* | 15.07<br>*(2.969)* | 193<br>*(89.4)* | 61<br>*(16.1)* | 75<br>*(24.1)* | 28.945<br>*(97.743)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 16.88<br>*(12.59)* | 2669 | 1.183<br>*(4.478)* | 0.489<br>*(0.297)* | 14.26<br>*(2.812)* | 186<br>*(85.6)* | 60<br>*(15.6)* | 76<br>*(24.4)* | ......<br>...... |
| 0.00<br>*(0.00)* | 2774 | 0.439<br>*(1.662)* | ......<br>...... | ......<br>...... | 163<br>*(72.8)* | 61<br>*(16.1)* | 76<br>*(24.4)* | ......<br>...... |
| 8.63<br>*(6.44)* | 2721 | 0.792<br>*(2.998)* | 0.640<br>*(0.389)* | 10.90<br>*(2.148)* | 165<br>*(73.9)* | 60<br>*(15.6)* | 76<br>*(24.2)* | ......<br>...... |
| 19.50<br>*(14.54)* | 2505 | 1.329<br>*(5.031)* | 0.475<br>*(0.289)* | 14.67<br>*(2.890)* | 188<br>*(86.4)* | 61<br>*(16.1)* | 76<br>*(24.2)* | ......<br>...... |
| 4.36<br>*(3.25)* | 2744 | 0.602<br>*(2.279)* | 0.963<br>*(0.586)* | 7.24<br>*(1.426)* | 168<br>*(75.6)* | 61<br>*(16.1)* | 77<br>*(25.0)* | ......<br>...... |
| 12.81<br>*(9.55)* | 2662 | 0.981<br>*(3.713)* | 0.534<br>*(0.325)* | 13.06<br>*(2.572)* | 174<br>*(79.2)* | 61<br>*(16.1)* | 76<br>*(24.4)* | ......<br>...... |
| **Av** 10.36<br>**Av** *(7.73)* | 2679 | 0.888<br>*(3.361)* | 0.597<br>*(0.363)* | 11.67<br>*(2.300)* | 175<br>*(79.3)* | 61<br>*(16.0)* | 76<br>*(24.4)* | 28.910<br>*(97.629)* |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (3-1) Gear** | | | | | | | | | | | |
| 15.38<br>*(11.47)* | 1205<br>*(5.36)* | 4.79<br>*(7.71)* | 2507 | 8.52 | 1.291<br>*(4.886)* | 0.585<br>*(0.356)* | 11.92<br>*(2.347)* | 183<br>*(83.9)* | 60<br>*(15.6)* | 73<br>*(22.8)* | 28.885<br>*(97.540)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (3-1) Gear** | | | | | | | | | | | |
| 12.62<br>*(9.41)* | 953<br>*(4.24)* | 4.97<br>*(7.99)* | 2606 | 7.26 | 1.154<br>*(4.370)* | 0.638<br>*(0.388)* | 10.93<br>*(2.154)* | 172<br>*(77.6)* | 63<br>*(17.4)* | 66<br>*(18.7)* | 28.721<br>*(96.987)* |
| **50% of Pull at Maximum Power—Two Hours 7th (3-1) Gear** | | | | | | | | | | | |
| 8.80<br>*(6.56)* | 635<br>*(2.82)* | 5.20<br>*(8.37)* | 2707 | 4.71 | 0.950<br>*(3.596)* | 0.753<br>*(0.458)* | 9.26<br>*(1.824)* | 169<br>*(76.1)* | 65<br>*(18.3)* | 68<br>*(20.0)* | 28.750<br>*(97.084)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 8th (3-2) Gear** | | | | | | | | | | | |
| 8.80<br>*(6.56)* | 634<br>*(2.82)* | 5.20<br>*(8.38)* | 1813 | 4.34 | 0.771<br>*(2.918)* | 0.611<br>*(0.372)* | 11.42<br>*(2.249)* | 175<br>*(79.4)* | 67<br>*(19.4)* | 72<br>*(21.9)* | 28.650<br>*(96.747)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 12.29<br>*(9.16)* | 2073<br>*(9.22)* | 2.22<br>*(3.58)* | 2659 | 14.87 | 5th (2-2) Gear | 170<br>*(76.4)* | 55<br>*(12.8)* | 57<br>*(13.9)* | 28.880<br>*(97.523)* |
| 15.01<br>*(11.19)* | 1821<br>*(8.10)* | 3.09<br>*(4.97)* | 2599 | 13.00 | 6th (2-3) Gear | 172<br>*(77.5)* | 57<br>*(13.9)* | 61<br>*(16.1)* | 28.870<br>*(97.490)* |
| 16.14<br>*(12.04)* | 1266<br>*(5.63)* | 4.78<br>*(7.70)* | 2598 | 8.60 | 7th (3-1) Gear | 177<br>*(80.6)* | 58<br>*(14.4)* | 66<br>*(18.9)* | 28.900<br>*(97.591)* |
| 15.55<br>*(11.60)* | 795<br>*(3.54)* | 7.34<br>*(11.81)* | 2598 | 5.88 | 8th (3-2) Gear | 179<br>*(81.7)* | 58<br>*(14.4)* | 68<br>*(20.0)* | 28.910<br>*(97.625)* |

## LUGGING ABILITY IN 7th (3-1) GEAR

| Crankshaft Speed rpm | 2598 | 2337 | 2007 | 1820 | 1547 | 1287 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 1266<br>*(5.63)* | 1329<br>*(5.91)* | 1450<br>*(6.45)* | 1418<br>*(6.31)* | 1349<br>*(6.00)* | 1251<br>*(5.56)* |
| Increase in Pull % | 0 | 5 | 15 | 12 | 7 | -1 |
| Power—Hp *(kW)* | 16.14<br>*(12.04)* | 15.18<br>*(11.32)* | 14.66<br>*(10.93)* | 12.48<br>*(9.31)* | 10.14<br>*(7.56)* | 7.88<br>*(5.88)* |
| Speed—Mph *(km/h)* | 4.78<br>*(7.70)* | 4.28<br>*(6.89)* | 3.79<br>*(6.10)* | 3.30<br>*(5.31)* | 2.82<br>*(4.54)* | 2.36<br>*(3.80)* |
| Slip % | 8.60 | 9.03 | 9.93 | 10.10 | 9.60 | 9.05 |

**Department of Agricultural Engineering**

**Dates of Test:** June 10-21, 1982

**Manufacturer:** YANMAR DIESEL ENGINE CO., LTD, 1-32, Chayamachi, Kita-ku, Osaka, Japan

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE 30** **API service classification** SE/SF-CC/CD **To motor** 0.942 gal *(3.564 l)* **Drained from motor** 0.832 gal *(3.150 l)* **Transmission and hydraulic lubricant** J.D. 303 fluid or equivalent **Front axle lubricant** SAE 90 **Total time engine was operated** 43.5 hours.

**ENGINE:** **Make** Yanmar Diesel **Type** three cylinder vertical **Serial No.** 3T75H-00415 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 2.95" × 3.35" *(75 mm × 85 mm)* **Compression ratio** 22.5 to 1 **Displacement** 68.7 cu in *(1126 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** 226D-40458 **Tread width** rear 39.4" *(1000 mm)* to 47.4" *(1204 mm)* front 36.3" *(922 mm)* **Wheel base** 61.0" *(1550 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 26.1" *(664 mm)* Vertical distance above roadway 23.1" *(586 mm)* Horizontal distance from center of rear wheel tread 0.2" *(4 mm)* to the right **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (3) [illegible] operator controlled powershift **Adverti[illegible]ds mph** *(km/h)* first 0.8 *(1.2)* second 1.[illegible]hird 1.6 *(2.6)* fourth 1.8 *(2.8)* fifth 2.6 *(4.2)* sixth 3.6 *(5.9)* seventh 5.4 *(8.7)* eighth 8.0 *(12.9)* ninth 11.2 *(18.0)* reverse 1.2 *(2.0)*, 2.8 *(4.5)* 8.6 *(13.8)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** mechanical **Turning radius** (on concrete surface with brake applied) right 91.3" *(2.32 m)* left 91.3" *(2.32 m)* (on concrete surface without brake) right 98.8" *(2.51 m)* left 98.8" *(2.51 m)* **Turning space diameter** (on concrete surface with brake applied) right 195" *(4.95 m)* left 195" *(4.95 m)* (on concrete surface without brake) right 210" *(5.33 m)* left 210" *(5.33 m)* **Power take-off** 540 rpm at 2409 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB (A) |
|---|---|---|
| Maximum Available Power—Two Hours | 90.0 | 89.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 89.0 |
| 50% of Pull at Maximum Power—Two Hours | | 87.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 84.0 |
| Bystander in 9th (3-3) gear | | 75.5 |

## DRAWBAR PERFORMANCE
## (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (3-1) Gear** | | | | | | | | | | | |
| 15.13<br>*(11.29)* | 1140<br>*(5.07)* | 4.98<br>*(8.02)* | 2600 | 6.19 | 1.273<br>*(4.818)* | 0.586<br>*(0.357)* | 11.89<br>*(2.342)* | 185<br>*(84.7)* | 62<br>*(16.4)* | 75<br>*(23.9)* | 28.860<br>*(97.456)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 10.83<br>*(8.07)* | 2644<br>*(11.76)* | 1.54<br>*(2.47)* | 2696 | 14.77 | 4th (2-1) Gear | 168<br>*(75.3)* | 52<br>*(11.1)* | 53<br>*(11.7)* | 28.880<br>*(97.523)* |
| 16.21<br>*(12.09)* | 1225<br>*(5.45)* | 4.96<br>*(7.99)* | 2598 | 6.40 | 7th (3-1) Gear | 178<br>*(80.8)* | 58<br>*(14.4)* | 65<br>*(18.3)* | 28.900<br>*(97.591)* |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 9.5-24; 4; 14 *(95)* | Two 9.5-24; 4; 14 *(95)* |
| Ballast | —Liquid (each) | 158 lb *(71 kg)* | None |
| | —Cast Iron (each) | 220 lb *(100 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 6-14; 4; 28 *(195)* | Two 6-14; 4; 28 *(195)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 162 lb *(74 kg)* | None |
| Height of Drawbar | | 12.5 in *(315 mm)* | 12.5 in *(315 mm)* |
| Static Weight with Operator—Rear | | 2135 lb *(968 kg)* | 1380 lb *(626 kg)* |
| —Front | | 1245 lb *(565 kg)* | 920 lb *(417 kg)* |
| —Total | | 3380 lb *(1533 kg)* | 2300 lb *(1043 kg)* |

**Yanmar YM226D Diesel**

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests the fuel temperature at the injection pump was maintained at 144°F *(62.1°C)*. Four gears were chosen between 15% slip and 10 mph *(16.1 km/h)*..

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1442.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1443 — YANMAR YM276D DIESEL ALSO YANMAR YM276 DIESEL 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| | Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| MAXIMUM POWER AND FUEL CONSUMPTION | | | | | | | | | |
| Rated Engine Speed—Two Hours (PTO Speed—622 rpm) | | | | | | | | | |
| | 23.00<br>(17.15) | 2600 | 1.664<br>(6.299) | 0.504<br>(0.307) | 13.82<br>(2.723) | 195<br>(90.4) | 64<br>(17.7) | 75<br>(23.9) | 28.903<br>(97.602) |
| Standard Power Take-off Speed (540 rpm)—One Hour | | | | | | | | | |
| | 22.82<br>(17.02) | 2258 | 1.590<br>(6.019) | 0.486<br>(0.296) | 14.35<br>(2.828) | 203<br>(94.8) | 63<br>(17.2) | 74<br>(23.4) | 28.905<br>(97.608) |
| VARYING POWER AND FUEL CONSUMPTION—Two Hours | | | | | | | | | |
| | 19.96<br>(14.88) | 2656 | 1.467<br>(5.553) | 0.513<br>(0.312) | 13.60<br>(2.680) | 186<br>(85.3) | 64<br>(17.5) | 75<br>(23.9) | ......<br>...... |
| | 0.00<br>(0.00) | 2802 | 0.572<br>(2.165) | .....<br>..... | .....<br>..... | 162<br>(72.2) | 64<br>(17.5) | 75<br>(23.9) | ......<br>...... |
| | 10.27<br>(7.66) | 2739 | 0.972<br>(3.679) | 0.660<br>(0.402) | 10.56<br>(2.082) | 169<br>(76.1) | 63<br>(17.2) | 75<br>(23.9) | ......<br>...... |
| | 23.28<br>(17.36) | 2600 | 1.682<br>(6.367) | 0.504<br>(0.307) | 13.84<br>(2.727) | 193<br>(89.4) | 64<br>(17.5) | 76<br>(24.4) | ......<br>...... |
| | 5.20<br>(3.88) | 2764 | 0.774<br>(2.930) | 1.039<br>(0.632) | 6.71<br>(1.324) | 166<br>(74.2) | 64<br>(17.5) | 76<br>(24.7) | ......<br>...... |
| | 15.19<br>(11.33) | 2694 | 1.213<br>(4.592) | 0.557<br>(0.339) | 12.52<br>(2.467) | 170<br>(76.7) | 63<br>(17.2) | 74<br>(23.6) | ......<br>...... |
| Av<br>Av | 12.32<br>(9.19) | 2700 | 1.114<br>(4.217) | 0.631<br>(0.384) | 11.06<br>(2.179) | 174<br>(78.8) | 63<br>(17.4) | 75<br>(24.1) | 28.903<br>(97.602) |

## DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Available Power—Two Hours 10th (3-1) Gear | | | | | | | | | | | |
| 17.68<br>(13.19) | 1146<br>(5.10) | 5.79<br>(9.32) | 2599 | 7.24 | 1.595<br>(6.039) | 0.629<br>(0.383) | 11.08<br>(2.183) | 193<br>(89.2) | 64<br>(17.8) | 82<br>(27.5) | 28.865<br>(97.473) |
| 75% of Pull at Maximum Power—Ten Hours 10th (3-1) Gear | | | | | | | | | | | |
| 14.75<br>(11.00) | 921<br>(4.10) | 6.00<br>(9.66) | 2643 | 5.38 | 1.395<br>(5.279) | 0.659<br>(0.401) | 10.57<br>(2.083) | 175<br>(79.4) | 61<br>(16.1) | 76<br>(24.6) | 28.950<br>(97.760) |
| 50% of Pull at Maximum Power—Two Hours 10th (3-1) Gear | | | | | | | | | | | |
| 10.21<br>(7.61) | 615<br>(2.73) | 6.23<br>(10.03) | 2700 | 3.98 | 1.147<br>(4.343) | 0.784<br>(0.477) | 8.90<br>(1.753) | 168<br>(75.6) | 65<br>(18.3) | 76<br>(24.2) | 28.945<br>(97.743) |
| 50% of Pull at Reduced Engine Speed—Two Hours 11th (3-2) Gear | | | | | | | | | | | |
| 10.19<br>(7.60) | 614<br>(2.73) | 6.23<br>(10.03) | 2035 | 3.65 | 0.986<br>(3.732) | 0.675<br>(0.410) | 10.34<br>(2.036) | 169<br>(76.1) | 68<br>(20.0) | 78<br>(25.6) | 28.955<br>(97.777) |
| MAXIMUM POWER IN SELECTED GEARS | | | | | | | | | | | |
| 14.11<br>(10.52) | 2412<br>(10.73) | 2.19<br>(3.53) | 2659 | 14.87 | 7th (2-1) Gear | | | 169<br>(75.8) | 57<br>(13.9) | 64<br>(17.8) | 28.960<br>(97.794) |
| 16.98<br>(12.66) | 2218<br>(9.87) | 2.87<br>(4.62) | 2599 | 13.88 | 8th (2-2) Gear | | | 177<br>(80.3) | 58<br>(14.4) | 67<br>(19.4) | 28.960<br>(97.794) |
| 17.88<br>(13.34) | 1711<br>(7.61) | 3.92<br>(6.31) | 2600 | 10.94 | 9th (2-3) Gear | | | 190<br>(87.5) | 63<br>(17.2) | 78<br>(25.6) | 28.870<br>(97.490) |
| 18.93<br>(14.11) | 1228<br>(5.46) | 5.78<br>(9.30) | 2600 | 7.30 | 10th (3-1) Gear | | | 188<br>(86.4) | 63<br>(17.2) | 76<br>(24.4) | 28.870<br>(97.490) |
| 18.22<br>(13.59) | 875<br>(3.89) | 7.81<br>(12.57) | 2599 | 5.35 | 11th (3-2) Gear | | | 190<br>(87.8) | 63<br>(17.2) | 80<br>(26.7) | 28.870<br>(97.490) |

## LUGGING ABILITY IN 10th (3-1) GEAR

| Crankshaft Speed rpm | 2600 | 2345 | 2084 | 1818 | 1560 | 1291 |
|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 1228<br>(5.46) | 1342<br>(5.97) | 1418<br>(6.31) | 1363<br>(6.06) | 1347<br>(5.99) | 1319<br>(5.87) |
| Increase in Pull % | 0 | 9 | 15 | 11 | 10 | 7 |
| Power—Hp (kW) | 18.93<br>(14.11) | 18.49<br>(13.78) | 17.27<br>(12.88) | 14.55<br>(10.85) | 12.30<br>(9.17) | 9.98<br>(7.44) |
| Speed—Mph (km/h) | 5.78<br>(9.30) | 5.17<br>(8.31) | 4.57<br>(7.35) | 4.00<br>(6.44) | 3.42<br>(5.51) | 2.84<br>(4.57) |
| Slip % | 7.30 | 8.27 | 8.79 | 8.27 | 8.02 | 8.53 |

**Department of Agricultural Engineering**

**Dates of Test:** June 12-24, 1982

**Manufacturer:** YANMAR DIESEL ENGINE CO., LTD. 1-32, Chayamachi, Kita-ku, Osaka, Japan

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.036 gal *(3.921 l)* **Drained from motor** 0.893 gal *(3.380 l)* **Transmission and hydraulic lubricant** J.D. 303 fluid or equivalent **Front axle lubricant** SAE 90 **Total time engine was operated** 52.5 hours.

**ENGINE: Make** Yanmar Diesel **Type** three cylinder vertical **Serial No.** 3T84H-200347 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 3.31" × 3.35" *(84 mm × 85 mm)* **Compression ratio** 20 to 1 **Displacement** 86.2 cu in *(1413 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** front wheel assist **Serial No.** 276D-40365 **Tread width** rear 43.1" *(1094 mm)* to 54.9" *(1394 mm)* front 39.4" *(1000 mm)* **Wheel base** 64.0" *(1625 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 26.6" *(675 mm)* Vertical distance above roadway 28.3" *(718 mm)* Horizontal distance from center of rear wheel tread 0.1" *(2.5 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (3) range operator controlled powershift **Advertised speeds mph (km/h)** first 0.2 *(0.3)* second 0.2 *(0.4)* third 0.3 *(0.5)* fourth 0.8 *(1.3)* fifth 1.1 *(1.8)* sixth 1.4 *(2.3)* seventh 2.6 *(4.2)* eighth 3.5 *(5.6)* ninth 4.6 *(7.4)* tenth 6.5 *(10.5)* eleventh 8.6 *(13.9)* twelfth 11.4 *(18.4)* reverse 0.2 *(0.3)*, 1.1 *(1.7)* 3.4 *(5.5)* 8.4 *(13.5)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** mechanical **Turning radius** (on concrete surface with brake applied) right 93.7" *(2.38 m)* left 93.7" *(2.38 m)* (on concrete surface without brake) right 101.6" *(2.58 m)* left 101.6" *(2.58 m)* **Turning space diameter** (on concrete surface with brake applied) right 201" *(5.10 m)* left 201" *(5.10 m)* (on concrete surface without brake) right 216.5" *(5.50 m)* left 216.5" *(5.50 m)* **Power take-off** 540 rpm at 2258 engine rpm.

**REPAIRS and ADJUSTMENTS:** The air cleaner to manifold gasket was discovered to be missing during preliminary PTO tests. A new gasket was installed and test continued.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB (A) |
|---|---|---|
| Maximum Available Power—Two Hours | 90.0 | 90.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 90.0 |
| 50% of Pull at Maximum Power—Two Hours | | 92.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 90.0 |
| Bystander in 12th (3-3) gear | | 77.0 |

## DRAWBAR PERFORMANCE (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Available Power—Two Hours 10th (3-1) Gear | | | | | | | | | | | |
| 16.84<br>(12.56) | 1037<br>(4.61) | 6.09<br>(9.81) | 2600 | 4.66 | 1.595<br>(6.039) | 0.661<br>(0.402) | 10.56<br>(2.079) | 192<br>(88.6) | 66<br>(18.6) | 84<br>(28.6) | 28.820<br>(97.321) |
| MAXIMUM POWER IN SELECTED GEARS | | | | | | | | | | | |
| 9.98<br>(7.44) | 2973<br>(13.22) | 1.26<br>(2.03) | 2707 | 14.78 | 6th (1-3) Gear | | | 168<br>(75.3) | 60<br>(15.6) | 71<br>(21.7) | 28.950<br>(97.760) |
| 18.07<br>(13.47) | 1626<br>(7.23) | 4.17<br>(6.71) | 2600 | 7.51 | 9th (2-3) Gear | | | 192<br>(88.9) | 63<br>(17.2) | 79<br>(26.1) | 28.870<br>(97.490) |
| 19.06<br>(14.21) | 1181<br>(5.25) | 6.05<br>(9.74) | 2600 | 5.23 | 10th (3-1) Gear | | | 189<br>(87.2) | 63<br>(17.2) | 75<br>(23.9) | 28.870<br>(97.490) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 11.2-24; 4; 14 *(95)* | Two 11.2-24; 4; 14 *(95)* |
| Ballast | —Liquid (each) | 152 lb *(69 kg)* | None |
| | —Cast Iron (each) | 350 lb *(159 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 7-14; 4; 26 *(180)* | Two 7-14; 4; 26 *(180)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 200 lb *(91 kg)* | None |
| Height of Drawbar | | 13.5 in *(343 mm)* | 13.5 in *(343 mm)* |
| Static Weight with Operator—Rear | | 2650 lb *(1202 kg)* | 1645 lb *(746 kg)* |
| —Front | | 1460 lb *(662 kg)* | 1060 lb *(481 kg)* |
| —Total | | 4110 lb *(1864 kg)* | 2705 lb *(1227 kg)* |

**Yanmar YM276D Diesel**

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 136°F *(57.7°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*..

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1443.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Klein, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1444 — YANMAR YM336D DIESEL ALSO YANMAR YM336 DIESEL 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—622 rpm)** | | | | | | | | |
| 26.98<br>(20.12) | 2600 | 1.946<br>(7.366) | 0.503<br>(0.306) | 13.87<br>(2.731) | 175<br>(79.2) | 60<br>(15.8) | 76<br>(24.6) | 28.847<br>(97.411) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 25.03<br>(19.11) | 2257 | 1.797<br>(6.802) | 0.490<br>(0.297) | 14.27<br>(2.809) | 180<br>(82.0) | 60<br>(15.8) | 76<br>(24.4) | 28.810<br>(97.287) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 23.77<br>(17.73) | 2607 | 1.747<br>(6.613) | 0.512<br>(0.312) | 13.61<br>(2.681) | 164<br>(73.6) | 60<br>(15.6) | 76<br>(24.4) | ......<br>...... |
| 0.00<br>(0.00) | 2764 | 0.641<br>(2.426) | .....<br>..... | .....<br>.... | 140<br>(60.3) | 60<br>(15.3) | 75<br>(23.9) | ......<br>...... |
| 11.99<br>(8.94) | 2720 | 1.093<br>(4.137) | 0.636<br>(0.387) | 10.97<br>(2.161) | 148<br>(64.7) | 60<br>(15.3) | 74<br>(23.6) | ......<br>...... |
| 27.53<br>(20.53) | 2600 | 1.979<br>(7.491) | 0.501<br>(0.305) | 13.91<br>(2.741) | 170<br>(76.4) | 60<br>(15.6) | 74<br>(23.6) | ......<br>...... |
| 6.04<br>(4.50) | 2736 | 0.865<br>(3.274) | 0.998<br>(0.607) | 6.99<br>(1.374) | 145<br>(62.8) | 60<br>(15.6) | 75<br>(23.9) | ......<br>...... |
| 17.91<br>(13.36) | 2706 | 1.385<br>(5.243) | 0.539<br>(0.328) | 12.93<br>(2.548) | 154<br>(67.8) | 60<br>(15.6) | 74<br>(23.6) | ......<br>...... |
| Av 14.54<br>Av (10.84) | 2704 | 1.285<br>(4.864) | 0.616<br>(0.375) | 11.32<br>(2.229) | 154<br>(67.6) | 60<br>(15.4) | 75<br>(23.8) | 28.793<br>(97.231) |

## DRAWBAR PERFORMANCE (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (4-1) Gear** | | | | | | | | | | | |
| 22.46<br>(16.75) | 1341<br>(5.97) | 6.28<br>(10.11) | 2600 | 5.18 | 1.972<br>(7.464) | 0.612<br>(0.372) | 11.39<br>(2.244) | 176<br>(79.7) | 59<br>(14.7) | 71<br>(21.7) | 28.975<br>(97.844) |
| **75% of Pull at Maximum Power—Ten Hours 10th (4-1) Gear** | | | | | | | | | | | |
| 18.19<br>(13.56) | 1026<br>(4.56) | 6.65<br>(10.70) | 2715 | 3.79 | 1.707<br>(6.460) | 0.654<br>(0.398) | 10.66<br>(2.100) | 163<br>(72.7) | 61<br>(16.3) | 66<br>(19.0) | 28.891<br>(97.561) |
| **50% of Pull at Maximum Power—Two Hours 10th (4-1) Gear** | | | | | | | | | | | |
| 12.45<br>(9.28) | 684<br>(3.04) | 6.83<br>(10.99) | 2746 | 2.34 | 1.291<br>(4.886) | 0.723<br>(0.440) | 9.64<br>(1.900) | 166<br>(74.2) | 68<br>(19.7) | 77<br>(25.0) | 28.745<br>(97.068) |
| **50% of Pull at Reduced Engine Speed—Two Hours 11th (4-2) Gear** | | | | | | | | | | | |
| 12.48<br>(9.31) | 684<br>(3.04) | 6.84<br>(11.01) | 1890 | 2.26 | 1.094<br>(4.139) | 0.611<br>(0.372) | 11.41<br>(2.248) | 167<br>(75.0) | 68<br>(19.7) | 79<br>(25.8) | 28.740<br>(97.051) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 18.11<br>(13.51) | 3086<br>(13.73) | 2.20<br>(3.54) | 2700 | 15.00 | 7th (3-1) Gear | | | 159<br>(70.3) | 53<br>(11.7) | 60<br>(15.6) | 28.990<br>(97.895) |
| 21.98<br>(16.39) | 2561<br>(11.39) | 3.22<br>(5.18) | 2599 | 11.24 | 8th (3-2) Gear | | | 166<br>(74.4) | 56<br>(13.3) | 64<br>(17.8) | 28.990<br>(97.895) |
| 22.35<br>(16.67) | 1973<br>(8.78) | 4.25<br>(6.84) | 2600 | 7.97 | 9th (3-3) Gear | | | 174<br>(78.9) | 57<br>(13.9) | 67<br>(19.4) | 28.990<br>(97.895) |
| 23.00<br>(17.15) | 1374<br>(6.11) | 6.28<br>(10.10) | 2601 | 5.26 | 10th (4-1) Gear | | | 172<br>(77.8) | 56<br>(13.3) | 66<br>(18.9) | 28.990<br>(97.895) |
| 21.72<br>(16.20) | 876<br>(3.89) | 9.30<br>(14.97) | 2600 | 3.37 | 11th (4-2) Gear | | | 175<br>(79.2) | 57<br>(13.9) | 68<br>(20.0) | 28.980<br>(97.861) |

## LUGGING ABILITY IN 10th (4-1) GEAR

| Crankshaft Speed rpm | 2601 | 2351 | 2079 | 1812 | 1561 | 1265 |
|---|---|---|---|---|---|---|
| Pull—lbs (kN) | 1374<br>(6.11) | 1462<br>(6.50) | 1559<br>(6.93) | 1592<br>(7.08) | 1620<br>(7.21) | 1586<br>(7.05) |
| Increase in Pull % | 0 | 6 | 13 | 16 | 18 | 15 |
| Power—Hp (kW) | 23.00<br>(17.15) | 22.05<br>(16.43) | 20.71<br>(15.44) | 18.37<br>(13.70) | 16.08<br>(11.99) | 12.77<br>(9.52) |
| Speed—Mph (km/h) | 6.28<br>(10.10) | 5.65<br>(9.09) | 4.98<br>(8.02) | 4.33<br>(6.96) | 3.72<br>(5.99) | 3.02<br>(4.86) |
| Slip % | 5.26 | 5.50 | 5.91 | 6.15 | 6.34 | 6.24 |

**Department of Agricultural Engineering**

**Dates of Test:** June 15-23, 1982

**Manufacturer:** YANMAR DIESEL ENGINE CO., LTD, 1-32, Chayamachi, Kita-ku, Osaka, Japan

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.517 gal *(5.741 l)* **Drained from motor** 1.247 gal *(4.722 l)* **Transmission and hydraulic lubricant** J.D. 303 fluid or equivalent **Front axle lubricant** SAE 90 **Total time engine was operated** 41.0 hours.

**ENGINE:** **Make** Yanmar Diesel **Type** three cylinder vertical **Serial No.** 3T84A-400377 **Crankshaft** lengthwise **Rated rpm** 2600 **Bore and stroke** 3.31" × 3.54" *(84 mm × 90 mm)* **Compression ratio** 21 to 1 **Displacement** 91.3 cu in *(1496 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element with centrifugal precleaner **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist **Serial No.** 336D-40253 **Tread width** rear 45.3" *(1150 mm)* to 59.1" *(1500 mm)* front 44.9" *(1140 mm)* **Wheel base** 68.9" *(1750 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.6" *(726 mm)* Vertical distance above roadway 24.7" *(628 mm)* Horizontal distance from center of rear wheel tread 0.3" *(8.6 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (3) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 0.3 *(0.4)* second 0.4 *(0.6)* third 0.5 *(0.8)* fourth 1.0 *(1.6)* fifth 1.5 *(2.4)* sixth 1.9 *(3.0)* seventh 2.6 *(4.2)* eighth 3.8 *(6.0)* ninth 4.8 *(7.7)* tenth 6.9 *(11.0)* eleventh 10.0 *(16.1)* twelfth 12.7 *(20.4)* reverse 0.4 *(0.6)*, 1.4 *(2.2)* 3.6 *(5.7)* 9.4 *(15.2)* **Clutch** single plate dry disc operated by foot pedal **Brakes** drum and shoe operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 101" *(2.56 m)* left 101" *(2.56 m)* (on concrete surface without brake) right 109" *(2.76 m)* left 109" *(2.76 m)* **Turning space diameter** (on concrete surface with brake applied) right 216" *(5.49 m)* left 216" *(5.49 m)* (on concrete surface without brake) right 232" *(5.89 m)* left 232" *(5.89 m)* **Power take-off** 540 rpm at 2257 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) | Front Wheel Drive Disengaged dB (A) |
|---|---|---|
| Maximum Available Power—Two Hours | 90.0 | 89.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 88.5 |
| 50% of Pull at Maximum Power—Two Hours | | 88.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 86.0 |
| Bystander in 12th (4-3) gear | | 78.0 |

## DRAWBAR PERFORMANCE (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 10th (4-1) Gear** | | | | | | | | | | | |
| 21.42<br>(15.97) | 1236<br>(5.50) | 6.50<br>(10.46) | 2600 | 3.56 | 1.936<br>(7.329) | 0.630<br>(0.383) | 11.06<br>(2.179) | 178<br>(80.8) | 61<br>(15.8) | 75<br>(23.6) | 28.935<br>(97.709) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 16.98<br>(12.66) | 3911<br>(17.39) | 1.63<br>(2.62) | 2709 | 14.83 | 6th (2-3) Gear | | | 151<br>(66.1) | 52<br>(11.1) | 55<br>(12.8) | 28.990<br>(97.895) |
| 22.05<br>(16.44) | 1867<br>(8.30) | 4.43<br>(7.13) | 2600 | 5.64 | 9th (3-3) Gear | | | 176<br>(80.0) | 57<br>(13.9) | 68<br>(20.0) | 28.980<br>(97.861) |
| 22.08<br>(16.47) | 1279<br>(5.69) | 6.48<br>(10.42) | 2598 | 3.90 | 10th (4-1) Gear | | | 170<br>(76.7) | 56<br>(13.3) | 65<br>(18.3) | 28.990<br>(97.895) |

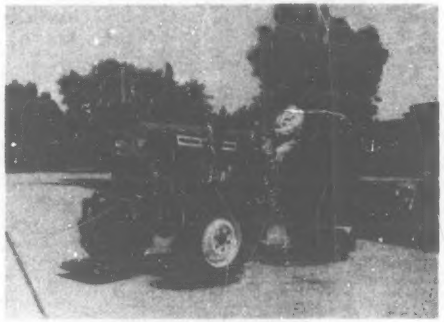
| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Two 12.4/11-28; 4; 14 (95) | Two 12.4/11-28; 4; 14 (95) |
| Ballast | —Liquid (each) | 293 lb (133 kg) | None |
| | —Cast Iron (each) | 300 lb (136 kg) | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 8-16; 6; 22 (150) | Two 8-16; 6; 22 (150) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 215 lb (97 kg) | None |
| Height of Drawbar | | 16 in (405 mm) | 16 in (405 mm) |
| Static Weight with Operator | —Rear | 3235 lb (1467 kg) | 2050 lb (930 kg) |
| | —Front | 1785 lb (810 kg) | 1355 lb (615 kg) |
| | —Total | 5020 lb (2277 kg) | 3405 lb (1545 kg) |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 149°F *(65.2°C)*. Five gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. One scratch was found on the front cylinder wall during final inspection.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1444**.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



**Yanmar YM336D Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Robert W. Kleis, Acting Dean and Director**

# NEBRASKA TRACTOR TEST 1445 — ALLIS CHALMERS 6140 DIESEL 10 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—594 rpm)** | | | | | | | | |
| 41.08 | 2500 | 3.142 | 0.553 | 13.08 | 184 | 74 | 76 | 28.820 |
| *(30.63)* | | *(11.894)* | *(0.324)* | *(2.575)* | *(84.6)* | *(23.2)* | *(24.2)* | *(97.321)* |
| **Standard Power Take-off Speed (541 rpm)—One Hour** | | | | | | | | |
| 38.04 | 2277 | 2.825 | 0.518 | 13.47 | 181 | 73 | 75 | 28.830 |
| *(28.37)* | | *(10.694)* | *(0.315)* | *(2.653)* | *(82.8)* | *(22.7)* | *(23.7)* | *(97.355)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 36.36 | 2602 | 2.882 | 0.553 | 12.62 | 175 | 72 | 74 | ...... |
| *(27.11)* | | *(10.910)* | *(0.336)* | *(2.485)* | *(79.4)* | *(22.2)* | *(23.1)* | ...... |
| 0.00 | 2731 | 1.157 | ...... | ...... | 166 | 72 | 74 | ...... |
| *(0.00)* | | *(4.380)* | ...... | ...... | *(74.4)* | *(22.2)* | *(23.3)* | ...... |
| 18.75 | 2682 | 1.923 | 0.715 | 9.75 | 170 | 72 | 75 | ...... |
| *(13.98)* | | *(7.279)* | *(0.435)* | *(1.921)* | *(76.9)* | *(22.2)* | *(23.9)* | ...... |
| 40.28 | 2504 | 3.132 | 0.542 | 12.86 | 181 | 72 | 74 | ...... |
| *(30.04)* | | *(11.856)* | *(0.330)* | *(2.534)* | *(82.8)* | *(22.2)* | *(23.6)* | ...... |
| 9.45 | 2708 | 1.531 | 1.130 | 6.17 | 166 | 72 | 75 | ...... |
| *(7.05)* | | *(5.795)* | *(0.688)* | *(1.217)* | *(74.7)* | *(21.9)* | *(23.9)* | ...... |
| 27.69 | 2644 | 2.366 | 0.596 | 11.71 | 172 | 72 | 74 | ...... |
| *(20.65)* | | *(8.956)* | *(0.363)* | *(2.306)* | *(77.8)* | *(22.2)* | *(23.6)* | ...... |
| Av 22.09 | 2645 | 2.165 | 0.684 | 10.20 | 172 | 72 | 74 | 28.847 |
| Av *(16.47)* | | *(8.195)* | *(0.416)* | *(2.010)* | *(77.7)* | *(22.2)* | *(23.6)* | *(97.411)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (2H) Gear** | | | | | | | | | | | |
| 33.31 | 2402 | 5.20 | 2501 | 6.61 | 3.065 | 0.642 | 10.87 | 181 | 65 | 76 | 29.065 |
| *(24.84)* | *(10.68)* | *(8.37)* | | | *(11.602)* | *(0.390)* | *(2.141)* | *(82.8)* | *(18.3)* | *(24.2)* | *(98.148)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (2H) Gear** | | | | | | | | | | | |
| 27.17 | 1838 | 5.54 | 2616 | 4.90 | 2.649 | 0.680 | 10.25 | 177 | 69 | 79 | 29.075 |
| *(20.26)* | *(8.18)* | *(8.92)* | | | *(10.028)* | *(0.414)* | *(2.020)* | *(80.4)* | *(20.5)* | *(25.9)* | *(98.182)* |
| **50% of Pull at Maximum Power—Two Hours 7th (2H) Gear** | | | | | | | | | | | |
| 18.79 | 1226 | 5.75 | 2668 | 3.34 | 2.115 | 0.785 | 8.88 | 174 | 68 | 81 | 29.060 |
| *(14.01)* | *(5.45)* | *(9.25)* | | | *(8.006)* | *(0.478)* | *(1.750)* | *(78.9)* | *(19.7)* | *(26.9)* | *(98.131)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 8th (3H) Gear** | | | | | | | | | | | |
| 18.79 | 1226 | 5.75 | 2219 | 3.28 | 1.846 | 0.685 | 10.18 | 173 | 68 | 82 | 29.035 |
| *(14.01)* | *(5.45)* | *(9.25)* | | | *(6.988)* | *(0.417)* | *(2.005)* | *(78.3)* | *(20.0)* | *(27.5)* | *(98.047)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 22.54 | 4768 | 1.77 | 2643 | 14.85 | 4th (4L) Gear | | | 170 | 63 | 65 | 29.000 |
| *(16.81)* | *(21.21)* | *(2.85)* | | | | | | *(76.7)* | *(17.2)* | *(18.3)* | *(97.929)* |
| 32.30 | 4097 | 2.96 | 2498 | 12.34 | 5th (5L) Gear | | | 179 | 64 | 72 | 29.060 |
| *(24.09)* | *(18.22)* | *(4.76)* | | | | | | *(81.7)* | *(17.8)* | *(22.2)* | *(98.131)* |
| 33.00 | 3434 | 3.60 | 2500 | 9.62 | 6th (1H) Gear | | | 178 | 64 | 71 | 29.050 |
| *(24.61)* | *(15.27)* | *(5.80)* | | | | | | *(81.1)* | *(17.8)* | *(21.7)* | *(98.097)* |
| 33.97 | 2451 | 5.20 | 2500 | 6.61 | 7th (2H) Gear | | | 175 | 62 | 66 | 29.010 |
| *(25.33)* | *(10.90)* | *(8.36)* | | | | | | *(79.4)* | *(16.7)* | *(18.9)* | *(97.962)* |
| 33.84 | 2002 | 6.34 | 2502 | 5.35 | 8th (3H) Gear | | | 177 | 63 | 69 | 29.030 |
| *(25.24)* | *(8.90)* | *(10.20)* | | | | | | *(80.6)* | *(17.2)* | *(20.6)* | *(98.030)* |
| 32.22 | 1246 | 9.69 | 2500 | 3.46 | 9th (4H) Gear | | | 177 | 63 | 70 | 29.040 |
| *(24.03)* | *(5.55)* | *(15.59)* | | | | | | *(80.6)* | *(17.2)* | *(21.1)* | *(98.064)* |

**Department of Agricultural Engineering**

**Dates of Test:** August 30-September 8, 1982

**Manufacturer:** TOYOSHA COMPANY, LTD., 55, Joshoji-16, Kadoma City, Osaka 571 Japan

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8376 **Fuel weight** 6.974 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** SE/SF-CC/CD **To motor** 1.845 gal *(6.984 l)* **Drained from motor** 1.427 gal *(5.402 l)* **Transmission and final drive lubricant** Allis Chalmers Power Fluid 821 **Total time engine was operated** 41.0 hours.

**ENGINE: Make** Toyosha Diesel **Type** three cylinder vertical **Serial No.** 3S233A00159 **Crankshaft** lengthwise **Rated rpm** 2500 **Bore and stroke** 3.858" × 4.055" *(98 mm × 103 mm)* **Compression ratio** 23 to 1 **Displacement** 142 cu in *(2330 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Fuel filter** one paper element **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** standard **Serial No.** 6140-1084* **Tread width** rear 54" *(1372 mm)* to 84" *(2134 mm)* front 51.4" *(1305 mm)* to 74.7" *(1897 mm)* **Wheel base** 77.9" *(1980 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.7" *(703 mm)* Vertical distance above roadway 27.7" *(704 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 0.8 *(1.3)* second 1.1 *(1.9)* third 1.4 *(2.2)* fourth 2.0 *(3.3)* fifth 3.5 *(5.6)* sixth 4.1 *(6.6)* seventh 5.7 *(9.2)* eighth 6.9 *(11.1)* ninth 10.3 *(16.6)* tenth 17.7 *(28.5)* reverse 1.4 *(2.2)*, 7.1 *(11.4)* **Clutch** single dry disc operated by foot pedal **Brakes** wet disc operated by two foot pedals which can be locked together **Steering** power assist **Turning radius** (on concrete surface with brake applied) right 120" *(3.05 m)* left 121" *(3.07 m)* (on concrete surface without brake) right 137" *(3.48 m)* left 137" *(3.48 m)* **Turning space diameter** (on concrete surface with brake applied) right 255" *(6.48 m)* left 257" *(6.53 m)* (on concrete surface without brake) right 288" *(7.32 m)* left 288" *(7.32 m)* **Power take-off** 541 rpm at 2277 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

## LUGGING ABILITY IN 7th (2H) GEAR

| Crankshaft Speed rpm | 2500 | 2256 | 2003 | 1759 | 1512 | 1249 |
|---|---|---|---|---|---|---|
| Pull—lbs | 2451 | 2567 | 2722 | 2804 | 2753 | 2609 |
| *(kN)* | *(10.90)* | *(11.42)* | *(12.11)* | *(12.47)* | *(12.25)* | *(11.61)* |
| Increase in Pull % | 0 | 5 | 11 | 14 | 12 | 6 |
| Power—Hp | 33.97 | 31.99 | 29.98 | 27.06 | 22.84 | 17.95 |
| *(kW)* | *(25.33)* | *(23.85)* | *(22.35)* | *(20.18)* | *(17.03)* | *(13.38)* |
| Speed—Mph | 5.20 | 4.67 | 4.13 | 3.62 | 3.11 | 2.58 |
| *(km/h)* | *(8.36)* | *(7.52)* | *(6.65)* | *(5.82)* | *(5.01)* | *(4.15)* |
| Slip % | 6.61 | 7.06 | 7.40 | 7.62 | 7.62 | 7.17 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 98.0 |
| 75% of Pull at Maximum Power—Ten Hours | 96.0 |
| 50% of Pull at Maximum Power—Two Hours | 95.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 94.0 |
| Bystander in 10th (5H) gear | 86.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 14.9-28; 4; 14 *(95)* | Two 14.9-28; 4; 14 *(95)* |
| Ballast | —Liquid (each) | 660 lb *(300 kg)* | None |
| | —Cast Iron (each) | 158 lb *(72 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 7.50-16; 4; 32 (220) | Two 7.50-16; 4; 32 (220) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 30 lb *(14 kg)* | None |
| Height of Drawbar | | 20 in *(510 mm)* | 20 in *(510 mm)* |
| Static Weight with Operator—Rear | | 4610 lb *(2091 kg)* | 2935 lb *(1331 kg)* |
| Front | | 1585 lb *(719 kg)* | 1525 lb *(692 kg)* |
| Total | | 6195 lb *(2810 kg)* | 4460 lb *(2023 kg)* |

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 139°F *(59.4°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1445.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**Allis Chalmers 6140 Diesel**

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Irwin T. Omtvedt, Dean and Director**

# NEBRASKA TRACTOR TEST 1446
# ALLIS CHALMERS 8010 POWERSHIFT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| | Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)** | | | | | | | | | |
| | 107.38<br>*(80.07)* | 2300 | 7.261<br>*(27.486)* | 0.472<br>*(0.287)* | 14.79<br>*(2.913)* | 186<br>*(85.6)* | 68<br>*(19.7)* | 75<br>*(23.7)* | 28.920<br>*(97.659)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | | |
| | 109.55<br>*(81.69)* | 2252 | 7.297<br>*(27.622)* | 0.465<br>*(0.283)* | 15.01<br>*(2.957)* | 186<br>*(85.6)* | 64<br>*(17.9)* | 77<br>*(24.8)* | 29.020<br>*(97.996)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | | |
| | 95.80<br>*(71.44)* | 2415 | 6.835<br>*(25.873)* | 0.498<br>*(0.303)* | 14.02<br>*(2.761)* | 182<br>*(83.1)* | 64<br>*(17.8)* | 78<br>*(25.3)* | ......<br>...... |
| | 0.00<br>*(0.00)* | 2540 | 2.615<br>*(9.899)* | .....<br>..... | .....<br>..... | 171<br>*(77.3)* | 64<br>*(17.8)* | 78<br>*(25.3)* | ......<br>...... |
| | 49.27<br>*(36.74)* | 2484 | 4.654<br>*(17.617)* | 0.659<br>*(0.401)* | 10.59<br>*(2.085)* | 180<br>*(82.2)* | 64<br>*(18.1)* | 78<br>*(25.3)* | ......<br>...... |
| | 109.01<br>*(81.29)* | 2301 | 7.235<br>*(27.387)* | 0.463<br>*(0.282)* | 15.07<br>*(2.968)* | 186<br>*(85.6)* | 64<br>*(17.5)* | 79<br>*(26.1)* | ......<br>...... |
| | 24.92<br>*(18.58)* | 2512 | 3.626<br>*(13.726)* | 1.015<br>*(0.617)* | 6.87<br>*(1.354)* | 172<br>*(78.1)* | 62<br>*(16.9)* | 76<br>*(24.7)* | ......<br>...... |
| | 73.00<br>*(54.44)* | 2452 | 5.670<br>*(21.463)* | 0.542<br>*(0.330)* | 12.88<br>*(2.536)* | 182<br>*(83.1)* | 64<br>*(17.5)* | 75<br>*(23.9)* | ......<br>...... |
| Av<br>*Av* | 58.67<br>*(43.75)* | 2451 | 5.108<br>*(19.336)* | 0.607<br>*(0.369)* | 11.49<br>*(2.264)* | 179<br>*(81.6)* | 64<br>*(17.6)* | 77<br>*(25.1)* | 29.002<br>*(98.151)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 91.46<br>*(68.21)* | 5559<br>*(24.73)* | 6.17<br>*(9.93)* | 2300 | 6.96 | 7.277<br>*(27.547)* | 0.555<br>*(0.338)* | 12.57<br>*(2.476)* | 184<br>*(84.2)* | 68<br>*(19.7)* | 70<br>*(21.1)* | 29.170<br>*(98.503)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (2F) Gear** | | | | | | | | | | | |
| 73.95<br>*(55.15)* | 4163<br>*(18.52)* | 6.66<br>*(10.72)* | 2426 | 4.80 | 6.442<br>*(24.385)* | 0.607<br>*(0.370)* | 11.48<br>*(2.262)* | 183<br>*(84.0)* | 70<br>*(20.8)* | 72<br>*(22.2)* | 29.086<br>*(98.219)* |
| **50% of Pull at Maximum Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 50.97<br>*(38.01)* | 2777<br>*(12.35)* | 6.88<br>*(11.08)* | 2465 | 3.20 | 5.341<br>*(20.219)* | 0.731<br>*(0.445)* | 9.54<br>*(1.880)* | 185<br>*(84.7)* | 74<br>*(23.1)* | 82<br>*(27.8)* | 28.975<br>*(97.844)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (3F) Gear** | | | | | | | | | | | |
| 51.09<br>*(38.10)* | 2777<br>*(12.35)* | 6.90<br>*(11.10)* | 1792 | 3.00 | 4.302<br>*(16.284)* | 0.587<br>*(0.357)* | 11.88<br>*(2.340)* | 188<br>*(86.7)* | 75<br>*(23.9)* | 88<br>*(31.1)* | 28.850<br>*(97.692)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 73.67<br>*(54.94)* | 9102<br>*(40.49)* | 3.04<br>*(4.88)* | 2421 | 14.81 | 3rd (3S) Gear | | | 177<br>*(80.6)* | 64<br>*(17.8)* | 65<br>*(18.3)* | 29.150<br>*(98.435)* |
| 84.42<br>*(62.95)* | 8624<br>*(38.36)* | 3.67<br>*(5.91)* | 2299 | 13.95 | 4th (4S) Gear | | | 182<br>*(83.1)* | 65<br>*(18.3)* | 66<br>*(18.9)* | 29.160<br>*(98.469)* |
| 90.91<br>*(67.79)* | 7984<br>*(35.51)* | 4.27<br>*(6.87)* | 2300 | 11.17 | 5th (1F) Gear | | | 183<br>*(83.9)* | 66<br>*(18.9)* | 67<br>*(19.4)* | 29.160<br>*(98.469)* |
| 83.62<br>*(62.36)* | 6476<br>*(28.81)* | 4.84<br>*(7.79)* | 2299 | 8.45 | 6th (5S) Gear | | | 184<br>*(84.2)* | 66<br>*(18.9)* | 68<br>*(20.0)* | 29.150<br>*(98.435)* |
| 93.01<br>*(69.36)* | 5658<br>*(25.17)* | 6.16<br>*(9.92)* | 2299 | 6.90 | 7th (2F) Gear | | | 184<br>*(84.4)* | 66<br>*(18.9)* | 68<br>*(20.0)* | 29.170<br>*(98.503)* |
| 85.19<br>*(63.53)* | 5103<br>*(22.70)* | 6.26<br>*(10.08)* | 2300 | 6.19 | 8th (6S) Gear | | | 183<br>*(83.9)* | 66<br>*(18.9)* | 67<br>*(19.4)* | 29.150<br>*(98.435)* |
| 92.91<br>*(69.29)* | 4004<br>*(17.81)* | 8.70<br>*(14.01)* | 2298 | 4.68 | 9th (3F) Gear | | | 184<br>*(84.4)* | 66<br>*(18.9)* | 67<br>*(19.4)* | 29.150<br>*(98.435)* |

**Department of Agricultural Engineering**

**Dates of Test:** August 30-September 10, 1982

**Manufacturer:** ALLIS CHALMERS CORPORATION P.O. Box 512, Milwaukee, Wisconsin 53201

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8376 **Fuel weight** 6.974 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W-40 **API service classification** SF-CD **To motor** 3.140 gal *(11.888 l)* **Drained from motor** 2.872 gal *(10.870 l)* **Transmission and final drive lubricant** Allis Chalmers Power Fluid 821 **Total time engine was operated** 40.0 hours.

**ENGINE:** **Make** Allis Chalmers Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 49-18702 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 3.875" × 4.25" *(98.4 mm × 107.9 mm)* **Compression ratio** 15.5 to 1 **Displacement** 301 cu in *(4933 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow paper cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, raditor for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

**CHASSIS:** **Type** standard **Serial No.** 8010S 1408 **Tread width** rear 59" *(1499 mm)* to 97" *(2463 mm)* front 60" *(1524 mm)* to 90" *(2286 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.6" *(777 mm)* Vertical distance above roadway 40.4" *(1026 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (6) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.8 *(2.9)* second 2.5 *(4.0)* third 3.5 *(5.6)* fourth 4.4 *(7.1)* fifth 4.9 *(7.9)* sixth 5.4 *(8.7)* seventh 6.8 *(11.0)* eighth 6.8 *(11.0)* ninth 9.3 *(15.0)* tenth 11.8 *(19.0)* eleventh 14.6 *(23.5)* twelfth 18.4 *(30.0)* reverse 2.9 *(4.7)*, 7.9 *(12.7)* **Clutch** multiple wet disc hydraulically power actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 144.5" *(3.67 m)* left 145.5" *(3.70 m)* (on concrete surface without brake) right 166.2" *(4.22 m)* left 167.2" *(4.25 m)* **Turning space diameter** (on concrete surface with brake applied) right 312.5" *(7.94 m)* left 314.5" *(7.99 m)* (on concrete surface without brake) right 356.0" *(9.04 m)* left 358.0" *(9.09 m)* **Power take-off** 540 rpm at 2230 engine rpm and 1000 rpm at 2252 rpm.

## LUGGING ABILITY IN 7th (2F) GEAR

| Crankshaft Speed rpm | 2299 | 2071 | 1847 | 1612 | 1383 | 1154 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 5658<br>*(25.17)* | 6284<br>*(27.96)* | 6394<br>*(28.44)* | 6573<br>*(29.24)* | 6271<br>*(27.89)* | 5496<br>*(24.44)* |
| Increase in Pull % | 0 | 11 | 13 | 16 | 11 | –3 |
| Power—Hp<br>*(kW)* | 93.01<br>*(69.36)* | 91.83<br>*(68.48)* | 83.36<br>*(62.16)* | 74.48<br>*(55.54)* | 61.22<br>*(45.65)* | 45.32<br>*(33.79)* |
| Speed—Mph<br>*(km/h)* | 6.16<br>*(9.92)* | 5.50<br>*(8.85)* | 4.89<br>*(7.87)* | 4.25<br>*(6.84)* | 3.66<br>*(5.89)* | 3.09<br>*(4.98)* |
| Slip % | 6.90 | 7.93 | 8.22 | 8.50 | 8.08 | 7.07 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 79.5 |
| 75% of Pull at Maximum Power—Ten Hours | 79.0 |
| 50% of Pull at Maximum Power—Two Hours | 77.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 75.0 |
| Bystander in 12th (6F) gear | 87.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Two 18.4-38; 8; 18 *(125)* | Two 18.4-38; 8; 18 *(125)* |
| Ballast | —Liquid (each) | None | None |
| | —Tom Equip. (each) | 180 lb *(81 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 10.00-16; 8; 44 (305) | Two 10.00-16; 8; 44 (305) |
| Ballast | —Liquid (each) | None | None |
| | —Tom Equip. (each) | 100 lb *(45 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator—Rear | | 9335 lb *(4234 kg)* | 8980 lb *(4073 kg)* |
| Front | | 3850 lb *(1746 kg)* | 3650 lb *(1656 kg)* |
| Total | | 13185 lb *(5980 kg)* | 12630 lb *(5729 kg)* |

**Allis Chalmers 8010 Power Shift Diesel**

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 151°F *(66.1°C)*. Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1446.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Irwin T. Omtvedt, Dean and Director

# NEBRASKA TRACTOR TEST 1447
# ALLIS CHALMERS 8030 POWERSHIFT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)** | | | | | | | | |
| 133.75<br>*(99.74)* | 2300 | 8.882<br>*(33.622)* | 0.468<br>*(0.285)* | 15.06<br>*(2.967)* | 188<br>*(86.3)* | 66<br>*(18.8)* | 75<br>*(23.9)* | 29.030<br>*(98.030)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 134.43<br>*(100.24)* | 2252 | 8.814<br>*(33.363)* | 0.457<br>*(0.278)* | 15.25<br>*(3.004)* | 190<br>*(87.8)* | 66<br>*(18.9)* | 75<br>*(23.9)* | 29.025<br>*(98.013)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 119.84<br>*(89.36)* | 2423 | 8.337<br>*(31.559)* | 0.486<br>*(0.295)* | 14.38<br>*(2.832)* | 187<br>*(86.1)* | 65<br>*(18.3)* | 75<br>*(23.9)* | ……<br>…… |
| 0.00<br>*(0.00)* | 2583 | 3.037<br>*(11.496)* | ……<br>…… | ……<br>…… | 171<br>*(77.3)* | 66<br>*(18.9)* | 78<br>*(25.3)* | ……<br>…… |
| 61.84<br>*(46.11)* | 2500 | 5.657<br>*(21.414)* | 0.638<br>*(0.388)* | 10.93<br>*(2.153)* | 180<br>*(82.2)* | 65<br>*(18.3)* | 74<br>*(23.3)* | ……<br>…… |
| 133.77<br>*(99.75)* | 2300 | 8.857<br>*(33.527)* | 0.462<br>*(0.281)* | 15.10<br>*(2.975)* | 188<br>*(86.7)* | 65<br>*(18.3)* | 74<br>*(23.6)* | ……<br>…… |
| 31.34<br>*(23.37)* | 2534 | 4.315<br>*(16.334)* | 0.960<br>*(0.584)* | 7.26<br>*(1.431)* | 175<br>*(79.4)* | 66<br>*(18.9)* | 76<br>*(24.7)* | ……<br>…… |
| 91.43<br>*(68.18)* | 2464 | 6.995<br>*(26.479)* | 0.534<br>*(0.325)* | 13.07<br>*(2.575)* | 182<br>*(83.6)* | 65<br>*(18.3)* | 75<br>*(23.9)* | ……<br>…… |
| Av 73.04<br>*Av (54.47)* | 2467 | 6.199<br>*(23.466)* | 0.592<br>*(0.360)* | 11.78<br>*(2.321)* | 181<br>*(82.8)* | 65<br>*(18.5)* | 75<br>*(24.1)* | 29.010<br>*(97.962)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 115.22<br>*(85.92)* | 6816<br>*(30.32)* | 6.34<br>*(10.20)* | 2299 | 4.67 | 8.908<br>*(33.721)* | 0.539<br>*(0.328)* | 12.93<br>*(2.548)* | 189<br>*(86.9)* | 71<br>*(21.4)* | 75<br>*(23.6)* | 29.045<br>*(98.081)* |
| **75% of Pull at Maximum Power—Ten Hours 7th (2F) Gear** | | | | | | | | | | | |
| 93.86<br>*(69.99)* | 5166<br>*(22.98)* | 6.81<br>*(10.97)* | 2440 | 3.32 | 7.904<br>*(29.921)* | 0.587<br>*(0.357)* | 11.87<br>*(2.339)* | 186<br>*(85.3)* | 72<br>*(21.9)* | 75<br>*(24.1)* | 28.872<br>*(97.496)* |
| **50% of Pull at Maximum Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 64.17<br>*(47.85)* | 3443<br>*(15.32)* | 6.99<br>*(11.25)* | 2470 | 2.18 | 6.417<br>*(24.290)* | 0.697<br>*(0.424)* | 10.00<br>*(1.970)* | 185<br>*(85.0)* | 73<br>*(22.8)* | 79<br>*(26.1)* | 29.005<br>*(97.946)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (3F) Gear** | | | | | | | | | | | |
| 64.16<br>*(47.84)* | 3445<br>*(15.32)* | 6.99<br>*(11.25)* | 1792 | 2.18 | 5.431<br>*(20.558)* | 0.590<br>*(0.359)* | 11.81<br>*(2.327)* | 189<br>*(87.2)* | 76<br>*(24.2)* | 82<br>*(27.5)* | 28.980<br>*(97.861)* |

## MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 103.58<br>*(77.24)* | 13348<br>*(59.37)* | 2.91<br>*(4.68)* | 2315 | 14.93 | 3rd (3S) Gear | 186<br>*(85.6)* | 66<br>*(18.9)* | 71<br>*(21.7)* | 28.680<br>*(96.848)* |
| 112.81<br>*(84.13)* | 10791<br>*(48.00)* | 3.92<br>*(6.31)* | 2301 | 6.47 | 4th (4S) Gear | 187<br>*(85.8)* | 68<br>*(20.0)* | 70<br>*(21.1)* | 29.070<br>*(98.165)* |
| 116.52<br>*(86.89)* | 9743<br>*(43.34)* | 4.48<br>*(7.22)* | 2302 | 7.05 | 5th (1F) Gear | 187<br>*(85.8)* | 68<br>*(20.0)* | 70<br>*(21.1)* | 29.070<br>*(98.165)* |
| 110.36<br>*(82.29)* | 8273<br>*(36.80)* | 5.00<br>*(8.05)* | 2300 | 5.85 | 6th (5S) Gear | 186<br>*(85.6)* | 68<br>*(20.0)* | 69<br>*(20.6)* | 29.070<br>*(98.165)* |
| 116.65<br>*(86.99)* | 6886<br>*(30.63)* | 6.35<br>*(10.22)* | 2299 | 4.63 | 7th (2F) Gear | 187<br>*(85.8)* | 68<br>*(20.0)* | 69<br>*(20.6)* | 29.070<br>*(98.165)* |
| 111.64<br>*(83.25)* | 6526<br>*(29.03)* | 6.42<br>*(10.32)* | 2302 | 4.32 | 8th (6S) Gear | 186<br>*(85.6)* | 67<br>*(19.4)* | 68<br>*(20.0)* | 29.070<br>*(98.165)* |
| 114.69<br>*(85.53)* | 4837<br>*(21.51)* | 8.89<br>*(14.31)* | 2501 | 3.07 | 9th (3F) Gear | 186<br>*(85.6)* | 67<br>*(19.4)* | 68<br>*(20.0)* | 29.070<br>*(98.165)* |

**Department of Agricultural Engineering**

**Dates of Test:** August 31-September 13, 1982

**Manufacturer:** ALLIS CHALMERS CORPORATION, P.O. Box 512, Milwaukee, Wisconsin 53201

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8376 **Fuel weight** 6.974 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W-40 **API service classification** SF-CD **To motor** 4.000 gal *(15.141 l)* **Drained from motor** 3.731 gal *(14.122 l)* **Transmission and final drive lubricant** Allis Chalmers Power Fluid 821 **Total time engine was operated** 36.0 hours.

**ENGINE:** **Make** Allis Chalmers Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 70-22901 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 4.25" × 5.00" *(107.9 mm × 127.0 mm)* **Compression ratio** 15.5 to 1 **Displacement** 426 cu in *(6981 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

**CHASSIS:** **Type** standard with duals **Serial No.** 8050S 1422 **Tread width** rear 59" *(1499 mm)* to 123" *(3124 mm)* front 62" *(1574 mm)* to 90" *(2286 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 28.4" *(721 mm)* Vertical distance above roadway 41.2" *(1047 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (6) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.8 *(2.9)* second 2.5 *(4.0)* third 3.5 *(5.6)* fourth 4.4 *(7.1)* fifth 4.9 *(7.9)* sixth 5.4 *(8.7)* seventh 6.8 *(11.0)* eighth 6.8 *(11.0)* ninth 9.3 *(15.0)* tenth 11.8 *(19.0)* eleventh 14.6 *(23.5)* twelfth 18.4 *(30.0)* reverse 2.9 *(4.7)*, 7.9 *(12.7)* **Clutch** multiple wet disc hydraulically power actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 149.7" *(3.80 m)* left 149.7" *(3.80 m)* (on concrete surface without brake) right 167.5" *(4.25 m)* left 168.4" *(4.28 m)* **Turning space diameter** (on concrete surface with brake applied) right 320.0" *(8.13 m)* left 320.0" *(8.13 m)* (on concrete surface without brake) right 355.5" *(9.03 m)* left 357.0" *(9.07 m)* **Power take-off** 540 rpm at 2230 engine rpm and 1000 rpm at 2252 engine rpm.

## LUGGING ABILITY IN 7th (2F) GEAR

| Crankshaft Speed rpm | 2299 | 2073 | 1847 | 1614 | 1381 | 1153 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 6886<br>*(30.63)* | 7846<br>*(34.90)* | 8252<br>*(36.71)* | 8240<br>*(36.65)* | 8040<br>*(35.76)* | 7161<br>*(31.85)* |
| Increase in Pull % | 0 | 14 | 20 | 20 | 17 | 4 |
| Power—Hp *(kW)* | 116.65<br>*(86.99)* | 118.91<br>*(88.67)* | 110.97<br>*(82.75)* | 96.83<br>*(72.21)* | 80.92<br>*(60.35)* | 60.55<br>*(45.16)* |
| Speed—Mph *(km/h)* | 6.35<br>*(10.22)* | 5.68<br>*(9.15)* | 5.04<br>*(8.12)* | 4.41<br>*(7.09)* | 3.77<br>*(6.07)* | 3.17<br>*(5.10)* |
| Slip % | 4.63 | 5.32 | 5.62 | 5.77 | 5.62 | 4.86 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 78.0 |
| 75% of Pull at Maximum Power—Ten Hours | 79.5 |
| 50% of Pull at Maximum Power—Two Hours | 79.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 76.0 |
| Bystander in 12th (6F) gear | 90.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Inner Two 18.4-38; 8; 14 *(95)*<br>Outer Two 18.4-38; 6; 14 *(95)* | Inner Two 18.4-38; 8; 14 *(95)*<br>Outer Two 18.4-38; 6; 14 *(95)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each inner) | 910 lb *(413 kg)* | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Two 11.00-16; 8; 40 *(275)* | Two 11.00-16; 8; 40 *(275)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 133 lb *(60 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator | —Rear | 12820 lb *(5815 kg)* | 11000 lb *(4990 kg)* |
| | Front | 4280 lb *(1942 kg)* | 4015 lb *(1821 kg)* |
| | Total | 17100 lb *(7757 kg)* | 15015 lb *(6811 kg)* |

**Allis Chalmers 8030 Powershift Diesel**

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 178°F *(81.3°C)*. Seven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1447.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
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Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska-Lincoln**
**Irwin T. Omtvedt, Dean and Director**

# NEBRASKA TRACTOR TEST 1448
# ALLIS CHALMERS 8050 POWERSHIFT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)** | | | | | | | | |
| 152.40<br>*(113.64)* | 2300 | 9.730<br>*(36.832)* | 0.445<br>*(0.271)* | 15.66<br>*(3.085)* | 189<br>*(87.4)* | 68<br>*(19.8)* | 75<br>*(24.0)* | 29.160<br>*(98.469)* |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 155.15<br>*(115.70)* | 2252 | 9.772<br>*(36.991)* | 0.439<br>*(0.267)* | 15.88<br>*(3.128)* | 190<br>*(87.8)* | 68<br>*(19.9)* | 75<br>*(23.7)* | 29.170<br>*(98.503)* |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 133.80<br>*(99.49)* | 2376 | 8.870<br>*(33.611)* | 0.462<br>*(0.281)* | 15.08<br>*(2.970)* | 185<br>*(85.0)* | 68<br>*(20.0)* | 75<br>*(23.9)* | ……<br>…… |
| 0.00<br>*(0.00)* | 2574 | 2.985<br>*(11.299)* | ……<br>…… | ……<br>…… | 174<br>*(78.9)* | 68<br>*(20.0)* | 75<br>*(23.9)* | ……<br>…… |
| 69.64<br>*(51.93)* | 2476 | 5.977<br>*(22.701)* | 0.601<br>*(0.365)* | 11.61<br>*(2.288)* | 180<br>*(82.3)* | 67<br>*(19.4)* | 74<br>*(23.3)* | ……<br>…… |
| 152.54<br>*(113.75)* | 2300 | 9.748<br>*(36.900)* | 0.446<br>*(0.271)* | 15.65<br>*(3.083)* | 188<br>*(86.9)* | 68<br>*(20.0)* | 75<br>*(23.9)* | ……<br>…… |
| 35.37<br>*(26.38)* | 2516 | 4.474<br>*(16.936)* | 0.882<br>*(0.537)* | 7.91<br>*(1.558)* | 176<br>*(79.7)* | 68<br>*(20.0)* | 75<br>*(23.9)* | ……<br>…… |
| 102.67<br>*(76.56)* | 2428 | 7.408<br>*(28.043)* | 0.505<br>*(0.306)* | 13.86<br>*(2.730)* | 184<br>*(84.2)* | 68<br>*(20.0)* | 76<br>*(24.4)* | ……<br>…… |
| Av 82.35<br>*Av (61.41)* | 2448 | 6.582<br>*(24.916)* | 0.557<br>*(0.339)* | 12.51<br>*(2.465)* | 181<br>*(83.9)* | 68<br>*(19.9)* | 75<br>*(23.5)* | 29.177<br>*(98.529)* |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 5th (1F) Gear** | | | | | | | | | | | |
| 131.44<br>*(98.01)* | 10072<br>*(44.80)* | 4.89<br>*(7.88)* | 2300 | 6.02 | 9.589<br>*(36.299)* | 0.509<br>*(0.309)* | 13.71<br>*(2.700)* | 185<br>*(85.0)* | 58<br>*(14.2)* | 61<br>*(15.8)* | 29.055<br>*(98.114)* |
| **75% of Pull at Maximum Power—Ten Hours 5th (1F) Gear** | | | | | | | | | | | |
| 106.06<br>*(79.09)* | 7575<br>*(33.70)* | 5.20<br>*(8.37)* | 2390 | 4.20 | 8.252<br>*(31.238)* | 0.548<br>*(0.333)* | 12.73<br>*(2.508)* | 187<br>*(86.3)* | 73<br>*(22.9)* | 82<br>*(27.7)* | 28.706<br>*(96.936)* |
| **50% of Pull at Maximum Power—Two Hours 5th (1F) Gear** | | | | | | | | | | | |
| 72.62<br>*(54.15)* | 5050<br>*(22.46)* | 5.39<br>*(8.68)* | 2450 | 2.76 | 6.721<br>*(25.443)* | 0.645<br>*(0.393)* | 10.80<br>*(2.128)* | 185<br>*(84.7)* | 74<br>*(23.3)* | 85<br>*(29.2)* | 28.685<br>*(96.865)* |
| **50% of Pull at Reduced Engine Speed—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 72.78<br>*(54.27)* | 5050<br>*(22.46)* | 5.40<br>*(8.70)* | 1779 | 2.67 | 5.754<br>*(21.779)* | 0.551<br>*(0.335)* | 12.65<br>*(2.492)* | 190<br>*(87.5)* | 76<br>*(24.4)* | 88<br>*(31.1)* | 28.670<br>*(96.814)* |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 106.81<br>*(79.65)* | 16728<br>*(74.41)* | 2.39<br>*(3.85)* | 2390 | 13.18 | 2nd (2S) Gear | | | 179<br>*(81.7)* | 52<br>*(11.1)* | 55<br>*(12.8)* | 29.100<br>*(98.266)* |
| 128.67<br>*(95.95)* | 14515<br>*(64.56)* | 3.32<br>*(5.35)* | 2300 | 9.20 | 3rd (3S) Gear | | | 185<br>*(84.7)* | 55<br>*(12.8)* | 58<br>*(14.4)* | 29.080<br>*(98.199)* |
| 130.62<br>*(97.40)* | 11357<br>*(50.52)* | 4.31<br>*(6.94)* | 2300 | 6.68 | 4th (4S) Gear | | | 186<br>*(85.3)* | 55<br>*(12.8)* | 57<br>*(13.9)* | 29.090<br>*(98.233)* |
| 134.15<br>*(100.03)* | 10281<br>*(45.73)* | 4.89<br>*(7.87)* | 2299 | 6.14 | 5th (1F) Gear | | | 184<br>*(84.4)* | 53<br>*(11.7)* | 55<br>*(12.8)* | 29.120<br>*(98.334)* |
| 125.60<br>*(93.66)* | 8665<br>*(38.55)* | 5.44<br>*(8.75)* | 2300 | 4.96 | 6th (5S) Gear | | | 184<br>*(84.4)* | 53<br>*(11.7)* | 55<br>*(12.8)* | 29.120<br>*(98.334)* |
| 132.41<br>*(98.74)* | 7218<br>*(32.11)* | 6.88<br>*(11.07)* | 2298 | 4.07 | 7th (2F) Gear | | | 185<br>*(85.0)* | 54<br>*(12.2)* | 56<br>*(13.3)* | 29.110<br>*(98.300)* |
| 134.72<br>*(99.80)* | 6731<br>*(29.94)* | 6.95<br>*(11.18)* | 2300 | 3.83 | 8th (6S) Gear | | | 185<br>*(85.0)* | 54<br>*(12.2)* | 56<br>*(13.3)* | 29.100<br>*(98.266)* |
| 127.41<br>*(95.01)* | 4970<br>*(22.11)* | 9.61<br>*(15.47)* | 2301 | 2.76 | 9th (3F) Gear | | | 184<br>*(84.4)* | 55<br>*(12.8)* | 57<br>*(13.9)* | 29.090<br>*(98.233)* |

**Department of Agricultural Engineering**

**Dates of Test:** September 1-17, 1982

**Manufacturer:** ALLIS CHALMERS CORPORATION, P.O. Box 512, Milwaukee, Wisconsin 55201

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8376 **Fuel weight** 6.974 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W-40 **API service classification** SE-CD **To motor** 4.052 gal *(15.337 l)* **Drained from motor** 3.325 gal *(12.587 l)* **Transmission and final drive lubricant** Allis Chalmers Power Fluid 821 **Total time engine was operated** 41 hours.

**ENGINE: Make** Allis Chalmers Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 70-22331 **Crankshaft** lengthwise **Rated rpm** 2300 **Bore and stroke** 4.25" × 5.00" *(107.9 mm × 127.0 mm)* **Compression ratio** 15.5 to 1 **Displacement** 426 cu in *(6981 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow cartridges and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

**CHASSIS: Type** standard with duals **Serial No.** 8050 S 1417 **Tread width** rear 61" *(1549 mm)* to 123" *(3124 mm)* front 63" *(1600 mm)* to 91" *(2311 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.7" *(704 mm)* Vertical distance above roadway 39.9" *(1014 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (6) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 2.0 *(3.2)* second 2.7 *(4.3)* third 3.7 *(6.0)* fourth 4.7 *(7.6)* fifth 5.3 *(8.5)* sixth 5.8 *(9.3)* seventh 7.3 *(11.7)* eighth 7.3 *(11.7)* ninth 10.0 *(16.1)* tenth 12.6 *(20.3)* eleventh 15.6 *(25.1)* twelfth 19.7 *(31.7)* reverse 3.2 *(5.1)*, 8.5 *(13.7)* **Clutch** multiple wet disc hydraulically power actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 145.0" *(3.68 m)* left 147.7" *(3.75 m)* (on concrete surface without brake) right 168.2" *(4.27 m)* left 169.1" *(4.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 323.0" *(8.20 m)* left 328.5" *(8.34 m)* (on concrete surface without brake) right 369.5" *(9.39 m)* left 371.2" *(9.43 m)* **Power take-off** 540 rpm at 2250 engine rpm and 1000 rpm at 2252 engine rpm.

## LUGGING ABILITY IN 5th (1F) GEAR

| Crankshaft Speed rpm | 2299 | 2073 | 1840 | 1617 | 1377 | 1156 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>*(kN)* | 10281<br>*(45.73)* | 11806<br>*(52.52)* | 11901<br>*(52.94)* | 11509<br>*(51.19)* | 11318<br>*(50.34)* | 10606<br>*(47.18)* |
| Increase in Pull % | 0 | 15 | 16 | 12 | 10 | 3 |
| Power—Hp<br>*(kW)* | 134.15<br>*(100.03)* | 137.35<br>*(102.43)* | 122.74<br>*(91.52)* | 104.58<br>*(77.99)* | 87.63<br>*(65.35)* | 69.28<br>*(51.66)* |
| Speed—Mph<br>*(km/h)* | 4.89<br>*(7.87)* | 4.36<br>*(7.02)* | 3.87<br>*(6.22)* | 3.41<br>*(5.48)* | 2.90<br>*(4.67)* | 2.45<br>*(3.94)* |
| Slip % | 6.14 | 7.06 | 7.06 | 6.76 | 6.76 | 6.45 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 79.0 |
| 75% of Pull at Maximum Power—Ten Hours | 79.0 |
| 50% of Pull at Maximum Power—Two Hours | 79.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 76.0 |
| Bystander in 11th (5F) gear | 88.0 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Inner Two 20.8-38; 10; 14 (95)<br>Outer Two 20.8-38; 8; 14 (95) | Inner Two 20.8-38; 10; 14 (95)<br>Outer Two 20.8-38; 8; 14 (95) |
| Ballast | —Liquid (each inner) | 938 lb *(425 kg)* | None |
| | —Cast Iron (each inner) | 930 lb *(422 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 14L-16.1; 6; 28 (193) | Two 14L-16.1; 6; 28 (193) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 170 lb *(77 kg)* | None |
| Height of Drawbar | | 22 in *(560 mm)* | 22 in *(560 mm)* |
| Static Weight with Operator | —Rear | 15040 lb *(6822 kg)* | 11306 lb *(5128 kg)* |
| | Front | 4340 lb *(1969 kg)* | 4000 lb *(1814 kg)* |
| | Total | 19380 lb *(8791 kg)* | 15306 lb *(6942 kg)* |

**Allis Chalmers 8050 Powershift Diesel**

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 168°F *(75.8°C)*. Eight gears were chosen between stability limit and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1448.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

**The Agricultural Experiment Station**
**Institute of Agriculture and Natural Resources**
**University of Nebraska–Lincoln**
**Irwin T. Omtvedt, Dean and Director**

# NEBRASKA TRACTOR TEST 1449
# ALLIS CHALMERS 8070 POWERSHIFT DIESEL
# 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1085 rpm)** | | | | | | | | |
| 170.72<br>(127.31) | 2400 | 10.692<br>(40.474) | 0.437<br>(0.266) | 15.97<br>(3.145) | 191<br>(88.4) | 69<br>(20.4) | 75<br>(24.0) | 28.915<br>(97.642) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 171.44<br>(127.84) | 2253 | 10.403<br>(39.380) | 0.425<br>(0.257) | 16.48<br>(3.246) | 192<br>(88.7) | 69<br>(20.4) | 74<br>(23.6) | 28.925<br>(97.675) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 151.31<br>(112.83) | 2503 | 9.961<br>(37.706) | 0.459<br>(0.279) | 15.19<br>(2.992) | 188<br>(86.9) | 70<br>(21.1) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2672 | 3.137<br>(11.875) | .....<br>..... | .....<br>..... | 175<br>(79.4) | 70<br>(21.1) | 76<br>(24.2) | ......<br>...... |
| 78.51<br>(58.54) | 2590 | 6.540<br>(24.757) | 0.582<br>(0.354) | 11.97<br>(2.359) | 182<br>(83.1) | 70<br>(20.6) | 75<br>(23.9) | ......<br>...... |
| 170.94<br>(127.47) | 2400 | 10.727<br>(40.606) | 0.438<br>(0.266) | 15.94<br>(3.139) | 192<br>(88.6) | 69<br>(20.6) | 75<br>(23.9) | ......<br>...... |
| 39.70<br>(29.60) | 2628 | 4.798<br>(18.162) | 0.843<br>(0.513) | 8.27<br>(1.630) | 177<br>(80.6) | 69<br>(20.6) | 76<br>(24.2) | ......<br>...... |
| 115.57<br>(86.18) | 2549 | 8.219<br>(31.112) | 0.496<br>(0.302) | 14.06<br>(2.770) | 186<br>(85.6) | 68<br>(20.3) | 75<br>(23.9) | ......<br>...... |
| Av 92.64<br>Av (69.08) | 2567 | 7.230<br>(27.369) | 0.544<br>(0.331) | 12.81<br>(2.524) | 183<br>(84.1) | 69<br>(20.5) | 75<br>(24.0) | 28.937<br>(97.715) |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 145.36<br>(108.40) | 9256<br>(41.19) | 5.89<br>(9.47) | 2400 | 4.54 | 10.632<br>(40.246) | 0.510<br>(0.310) | 13.67<br>(2.693) | 187<br>(86.1) | 54<br>(11.9) | 58<br>(14.2) | 29.225<br>(98.688) |
| **75% of Pull at Maximum Power—Ten Hours 7th (2F) Gear** | | | | | | | | | | | |
| 117.58<br>(87.68) | 7061<br>(31.41) | 6.24<br>(10.05) | 2518 | 3.51 | 9.357<br>(35.346) | 0.554<br>(0.337) | 12.59<br>(2.481) | 184<br>(84.2) | 58<br>(14.3) | 60<br>(15.3) | 28.992<br>(97.902) |
| **50% of Pull at Maximum Power—Two Hours 7th (2F) Gear** | | | | | | | | | | | |
| 80.87<br>(60.30) | 4707<br>(20.94) | 6.44<br>(10.37) | 2566 | 2.27 | 7.602<br>(28.776) | 0.655<br>(0.399) | 10.64<br>(2.096) | 180<br>(81.9) | 51<br>(10.6) | 53<br>(11.7) | 29.245<br>(98.756) |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (3F) Gear** | | | | | | | | | | | |
| 80.93<br>(60.35) | 4708<br>(20.94) | 6.45<br>(10.38) | 1864 | 2.32 | 6.472<br>(24.500) | 0.558<br>(0.339) | 12.50<br>(2.463) | 181<br>(82.8) | 53<br>(11.7) | 57<br>(13.6) | 29.235<br>(98.722) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 120.86<br>(90.13) | 18777<br>(83.52) | 2.41<br>(3.88) | 2406 | 14.60 | 2nd (2S) Gear | | | 183<br>(83.9) | 57<br>(13.9) | 59<br>(15.0) | 28.910<br>(97.625) |
| 142.59<br>(106.33) | 15725<br>(69.94) | 3.40<br>(5.47) | 2399 | 9.15 | 3rd (3S) Gear | | | 187<br>(85.8) | 57<br>(13.9) | 59<br>(15.0) | 28.900<br>(97.591) |
| 147.14<br>(109.72) | 13301<br>(59.16) | 4.15<br>(6.68) | 2400 | 7.12 | 4th (1F) Gear | | | 187<br>(86.1) | 57<br>(13.9) | 59<br>(15.0) | 28.910<br>(97.625) |
| 144.07<br>(107.44) | 12251<br>(54.49) | 4.41<br>(7.10) | 2400 | 6.58 | 5th (4S) Gear | | | 187<br>(86.1) | 57<br>(13.9) | 59<br>(15.0) | 28.910<br>(97.625) |
| 139.79<br>(104.24) | 9418<br>(41.89) | 5.57<br>(8.96) | 2401 | 4.86 | 6th (5S) Gear | | | 187<br>(86.1) | 57<br>(13.9) | 59<br>(15.0) | 28.910<br>(97.625) |
| 147.29<br>(109.83) | 9414<br>(41.88) | 5.87<br>(9.44) | 2399 | 4.86 | 7th (2F) Gear | | | 187<br>(86.1) | 57<br>(13.9) | 59<br>(15.0) | 28.910<br>(97.625) |
| 138.88<br>(103.56) | 7329<br>(32.60) | 7.11<br>(11.44) | 2400 | 3.73 | 8th (6S) Gear | | | 187<br>(86.1) | 56<br>(13.3) | 59<br>(15.0) | 28.900<br>(97.591) |
| 144.59<br>(107.82) | 6609<br>(29.40) | 8.20<br>(13.20) | 2396 | 3.23 | 9th (3F) Gear | | | 187<br>(85.8) | 56<br>(13.3) | 59<br>(15.0) | 28.900<br>(97.591) |

**Department of Agricultural Engineering**

**Dates of Test:** September 1-16, 1982

**Manufacturer:** ALLIS CHALMERS CORPORATION, P.O. Box 512, Milwaukee, Wisconsin 53201

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8373 **Fuel weight** 6.972 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W-40 **API service classification** SF-CD **To motor** 3.647 gal *(13.804 l)* **Drained from motor** 3.049 gal *(11.543 l)* **Transmission and final drive lubricant** Allis Chalmers Power Fluid 821 **Total time engine was operated** 40.5 hours.

**ENGINE:** **Make** Allis Chalmers Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 70-22839 **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.25" × 5.00" *(107.9 mm × 127.0 mm)* **Compression ratio** 15.5 to 1 **Displacement** 426 cu in *(6981 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** two full flow paper cartridges and one bypass cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** two paper cartridges **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

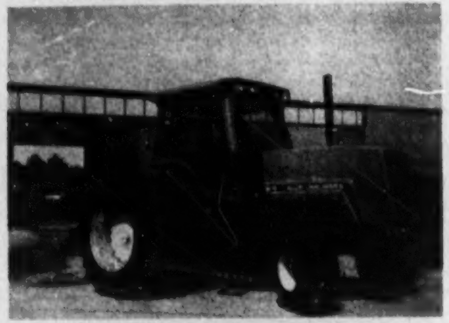
**CHASSIS:** **Type** standard with duals **Serial No.** 8070S 1227 **Tread width** rear 64" *(1626 mm)* to 123" *(3124 mm)* front 72" *(1829 mm)* to 100" *(2540 mm)* **Wheel base** 106" *(2692 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 27.1" *(689 mm)* Vertical distance above roadway 39.6" *(1006 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (6) range operator controlled powershift **Advertised speeds mph (km/h)** first 2.0 *(3.2)* second 2.7 *(4.3)* third 3.8 *(6.1)* fourth 4.5 *(7.2)* fifth 4.8 *(7.7)* sixth 5.9 *(9.4)* seventh 6.2 *(9.9)* eighth 7.5 *(12.0)* ninth 8.6 *(13.8)* tenth 10.8 *(17.3)* eleventh 13.4 *(21.5)* twelfth 16.8 *(27.0)* reverse 3.2 *(5.1)*, 7.3 *(11.7)* **Clutch** multiple wet disc hydraulically power actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically power actuated and operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 159.7" *(4.06 m)* left 158.6" *(4.03 m)* (on concrete surface without brake) right 173.0" *(4.39 m)* left 172.0" *(4.37 m)* **Turning space diameter** (on concrete surface with brake applied) right 345.0" *(8.76 m)* left 342.7" *(8.70 m)* (on concrete surface without brake) right 371.5" *(9.44 m)* left 370.2" *(9.40 m)* **Power take-off** 1000 rpm at 2253 engine rpm.

## LUGGING ABILITY IN 7th (2F) GEAR

| Crankshaft Speed rpm | 2399 | 2165 | 1922 | 1690 | 1451 | 1215 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 9414<br>(41.88) | 10341<br>(46.00) | 11103<br>(49.39) | 10843<br>(48.23) | 10089<br>(44.88) | 9506<br>(42.28) |
| Increase in Pull % | 0 | 10 | 18 | 15 | 7 | 1 |
| Power—Hp<br>(kW) | 147.29<br>(109.83) | 145.05<br>(108.16) | 137.74<br>(102.71) | 118.38<br>(88.28) | 94.98<br>(70.83) | 75.16<br>(56.05) |
| Speed—Mph<br>(km/h) | 5.87<br>(9.44) | 5.26<br>(8.47) | 4.65<br>(7.49) | 4.09<br>(6.59) | 3.53<br>(5.68) | 2.97<br>(4.77) |
| Slip % | 4.86 | 5.49 | 5.80 | 5.65 | 5.17 | 5.02 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 79.5 |
| 75% of Pull at Maximum Power—Ten Hours | 79.5 |
| 50% of Pull at Maximum Power—Two Hours | 80.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 77.0 |
| Bystander in 12th (6F) gear | 88.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Inner Two 20.8-38; 10; 16 *(110)*<br>Outer Two 20.8-38; 8; 16 *(110)* | Inner Two 20.8-38; 10; 16 *(110)*<br>Outer Two 20.8-38; 8; 16 *(110)* |
| Ballast | —Liquid (each inner) | 1705 lb *(773 kg)* | None |
| | —Cast iron (each inner) | 940 lb *(427 kg)* | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 18.4-16.1; 8; 20 *(140)* | Two 18.4-16.1; 8; 20 *(140)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast iron (each) | 115 lb *(52 kg)* | None |
| Height of Drawbar | | 20.5 in *(520 mm)* | 20.5 in *(520 mm)* |
| Static Weight with Operator—Rear | | 17830 lb *(8088 kg)* | 12540 lb *(5688 kg)* |
| Front | | 4540 lb *(2059 kg)* | 4310 lb *(1955 kg)* |
| Total | | 22370 lb *(10147 kg)* | 16850 lb *(7643 kg)* |



Allis Chalmers 8070 Powershift Diesel

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 161°F *(71.8°C)*. During final inspection, an area of scratches approximately 3/8" *(10 mm)* wide extending for the length of the bore was discovered on the left side of #5 cylinder wall. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1449.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Irvin T. Omtvedt, Dean and Director

# NEBRASKA TRACTOR TEST 1450 — HESSTON 1180DT TURBO FIAT DIESEL ALSO HESSTON 1180 TURBO FIAT DIESEL
## 12 SPEED

### POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1036 rpm)** | | | | | | | | |
| 107.48<br>(80.15) | 2550 | 6.673<br>(25.260) | 0.455<br>(0.277) | 16.11<br>(3.173) | 188<br>(86.8) | 67<br>(19.5) | 75<br>(23.9) | 28.983<br>(97.872) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 104.22<br>(77.72) | 2458 | 6.355<br>(24.049) | 0.425<br>(0.259) | 16.40<br>(3.232) | 187<br>(86.1) | 71<br>(21.5) | 76<br>(24.3) | 28.995<br>(97.912) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 93.65<br>(69.83) | 2615 | 6.140<br>(23.242) | 0.457<br>(0.278) | 15.25<br>(3.004) | 186<br>(85.3) | 70<br>(21.1) | 75<br>(23.9) | ......<br>...... |
| 0.00<br>(0.00) | 2691 | 2.242<br>(8.487) | ......<br>...... | ....<br>...... | 175<br>(79.4) | 70<br>(21.1) | 75<br>(23.9) | ......<br>...... |
| 47.38<br>(35.34) | 2600 | 4.155<br>(15.633) | 0.605<br>(0.368) | 11.53<br>(2.270) | 180<br>(82.2) | 70<br>(20.8) | 74<br>(23.6) | ......<br>...... |
| 108.39<br>(80.83) | 2548 | 6.708<br>(25.393) | 0.421<br>(0.256) | 16.16<br>(3.183) | 189<br>(87.2) | 70<br>(20.8) | 75<br>(23.9) | ......<br>...... |
| 23.82<br>(17.76) | 2674 | 3.145<br>(11.905) | 0.921<br>(0.560) | 7.57<br>(1.492) | 175<br>(79.4) | 70<br>(21.1) | 76<br>(24.2) | ......<br>...... |
| 70.64<br>(52.68) | 2653 | 5.086<br>(19.253) | 0.502<br>(0.305) | 13.89<br>(2.736) | 185<br>(85.0) | 71<br>(21.5) | 76<br>(24.7) | ......<br>...... |
| Av 57.38<br>Av (42.77) | 2637 | 4.576<br>(17.323) | 0.556<br>(0.338) | 12.54<br>(2.469) | 182<br>(83.3) | 70<br>(21.1) | 75<br>(24.1) | 29.003<br>(97.900) |

### DRAWBAR PERFORMANCE
### (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 92.68<br>(69.11) | 6500<br>(28.91) | 5.35<br>(8.61) | 2550 | 3.02 | 6.544<br>(24.772) | 0.492<br>(0.299) | 14.16<br>(2.790) | 189<br>(87.2) | 59<br>(14.7) | 70<br>(21.1) | 28.995<br>(97.912) |
| **75% of Pull at Maximum Power—Ten Hours 7th (M3) Gear** | | | | | | | | | | | |
| 73.35<br>(54.69) | 4920<br>(21.89) | 5.59<br>(9.00) | 2626 | 3.58 | 5.759<br>(21.799) | 0.547<br>(0.333) | 12.74<br>(2.509) | 186<br>(85.8) | 60<br>(15.5) | 65<br>(18.6) | 28.862<br>(97.463) |
| **50% of Pull at Maximum Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 50.27<br>(37.49) | 3280<br>(14.59) | 5.75<br>(9.25) | 2600 | 2.43 | 4.823<br>(18.257) | 0.669<br>(0.407) | 10.42<br>(2.053) | 181<br>(82.5) | 54<br>(11.9) | 57<br>(13.6) | 28.990<br>(97.893) |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (H1) Gear** | | | | | | | | | | | |
| 50.35<br>(37.55) | 3280<br>(14.59) | 5.76<br>(9.26) | 1694 | 2.39 | 3.514<br>(13.302) | 0.487<br>(0.296) | 14.33<br>(2.823) | 178<br>(81.1) | 57<br>(13.6) | 62<br>(16.4) | 29.025<br>(98.013) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 87.56<br>(65.29) | 12905<br>(57.40) | 2.54<br>(4.09) | 2587 | 14.54 | 4th (L4) Gear | | | 187<br>(86.1) | 58<br>(14.4) | 65<br>(18.3) | 28.920<br>(97.936) |
| 92.86<br>(69.16) | 10302<br>(45.83) | 3.37<br>(5.43) | 2549 | 8.84 | 5th (M1) Gear | | | 189<br>(87.2) | 56<br>(13.3) | 66<br>(18.9) | 29.040<br>(98.044) |
| 93.71<br>(69.88) | 8048<br>(35.80) | 4.37<br>(7.03) | 2550 | 6.20 | 6th (M2) Gear | | | 189<br>(86.9) | 55<br>(12.8) | 62<br>(16.7) | 29.060<br>(98.131) |
| 93.64<br>(69.83) | 6560<br>(29.18) | 5.35<br>(8.62) | 2550 | 4.98 | 7th (M3) Gear | | | 188<br>(86.4) | 52<br>(11.1) | 57<br>(13.9) | 29.080<br>(98.199) |
| 92.98<br>(69.34) | 5344<br>(23.77) | 6.52<br>(10.50) | 2551 | 3.80 | 8th (M4) Gear | | | 189<br>(86.9) | 53<br>(11.7) | 59<br>(15.0) | 29.070<br>(98.165) |
| 91.24<br>(68.04) | 3971<br>(17.66) | 8.62<br>(13.87) | 2550 | 2.92 | 9th (H1) Gear | | | 188<br>(86.7) | 54<br>(12.2) | 60<br>(15.6) | 29.070<br>(98.165) |

**Department of Agricultural Engineering**

**Dates of Test:** September 14-27, 1982

**Manufacturer:** FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100, Modena, Italy

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8373 **Fuel weight** 6.972 lbs/gal *(0.836 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 3.648 gal *(13.807 l)* **Drained from motor** 3.140 gal *(11.886 l)* **Transmission and final drive lubricant** API 505 **Total time engine was operated** 41.5 hours.

**ENGINE:** **Make** Fiat Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 8065.24*300-258851* **Crankshaft** lengthwise **Rated rpm** 2550 **Bore and stroke** 4.055" × 4.33" *(103 mm × 110 mm)* **Compression ratio** 15.7 to 1 **Displacement** 335 cu in *(5499 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** two full flow paper cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** front wheel assist with duals **Serial No.** 1280DT/12*760554* **Tread width** rear 64.6" *(1640 mm)* to 118.5" *(3010 mm)* front 70.7" *(1797 mm)* to 88" *(2235 mm)* **Wheel base** 105.2" *(2673 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 34.6" *(880 mm)* Vertical distance above roadway 42.5" *(1080 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.6 *(2.6)* second 2.0 *(3.2)* third 2.4 *(3.9)* fourth 2.9 *(4.7)* fifth 3.7 *(5.9)* sixth 4.6 *(7.4)* seventh 5.6 *(9.0)* eighth 6.7 *(10.8)* ninth 8.8 *(14.2)* tenth 11.1 *(17.9)* eleventh 13.4 *(21.6)* twelfth 16.2 *(26.1)* reverse 3.7 *(6.0)*, 4.7 *(7.6)*, 5.7 *(9.2)*, 6.9 *(11.1)* **Clutch** dry single disc hydraulically actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 202" *(5.14 m)* left 204" *(5.18 m)* (on concrete surface without brake) right 241" *(6.13 m)* left 241" *(6.13 m)* **Turning space diameter** (on concrete surface with brake applied) right 419" *(10.66 m)* left 423" *(10.73 m)* (on concrete surface without brake) right 497" *(12.63 m)* left 497" *(12.63 m)* **Power take-off** 540 rpm at 2261 engine rpm and 1000 rpm at 2458 engine rpm.

### LUGGING ABILITY IN 7th (M3) GEAR

| Crankshaft Speed rpm | 2550 | 2303 | 2045 | 1784 | 1529 | 1261 | 1019 |
|---|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 6560<br>(29.18) | 7064<br>(31.42) | 7284<br>(32.40) | 7322<br>(32.57) | 7649<br>(34.02) | 8001<br>(35.59) | 7487<br>(33.30) |
| Increase in Pull % | 0 | 8 | 11 | 12 | 17 | 22 | 14 |
| Power—Hp<br>(kW) | 93.64<br>(69.83) | 90.57<br>(67.54) | 82.85<br>(61.78) | 72.64<br>(54.17) | 65.24<br>(48.65) | 55.72<br>(41.55) | 42.30<br>(31.54) |
| Speed—Mph<br>(km/h) | 5.35<br>(8.62) | 4.81<br>(7.74) | 4.27<br>(6.86) | 3.72<br>(5.99) | 3.20<br>(5.15) | 2.61<br>(4.20) | 2.12<br>(3.41) |
| Slip % | 4.98 | 5.44 | 5.60 | 5.29 | 5.90 | 6.20 | 5.90 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 80.5 | 79.5 |
| 75% of Pull at Maximum Power—Ten Hours | | 79.0 |
| 50% of Pull at Maximum Power—Two Hours | | 78.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 75.5 |
| Bystander in 12th (H4) gear | | 88.5 |

### DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 93.68<br>(69.86) | 6460<br>(28.77) | 5.43<br>(8.74) | 2549 | 3.73 | 6.580<br>(24.908) | 0.490<br>(0.298) | 14.24<br>(2.805) | 189<br>(86.9) | 62<br>(16.4) | 73<br>(22.8) | 28.930<br>(97.683) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 86.50<br>(64.50) | 15317<br>(68.13) | 2.12<br>(3.41) | 2574 | 14.93 | 3rd (L3) Gear | | | 189<br>(86.9) | 59<br>(15.0) | 66<br>(18.9) | 29.020<br>(97.996) |
| 94.87<br>(70.75) | 7999<br>(35.58) | 4.45<br>(7.16) | 2548 | 4.64 | 6th (M2) Gear | | | 189<br>(86.9) | 55<br>(12.8) | 64<br>(17.8) | 29.050<br>(98.097) |
| 94.48<br>(70.46) | 6521<br>(29.00) | 5.43<br>(8.74) | 2550 | 3.83 | 7th (M3) Gear | | | 189<br>(86.9) | 51<br>(10.6) | 56<br>(13.3) | 29.080<br>(98.199) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Four 18.4-38; 8; 14 (95) | Four 18.4-38; 8; 14 (95) |
| Ballast | —Liquid (each inner) | 700 lb *(318 kg)* | None |
| | —Cast Iron (each) | None | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 14.9-28; 6; 20 (140) | Two 14.9-28; 6; 20 (140) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 266 lb *(121 kg)* | None |
| Height of Drawbar | | 22 in (560 mm) | 22 in (560 mm) |
| Static Weight with Operator—Rear | | 11660 lb (5289 kg) | 10260 lb (4654 kg) |
| Front | | 5225 lb (2370 kg) | 4690 lb (2127 kg) |
| Total | | 16885 lb (7659 kg) | 14950 lb (6781 kg) |

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Irvin T. Omtvedt, Dean and Director

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 144°F *(62.2°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1450.**

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

# NEBRASKA TRACTOR TEST 1451 — HESSTON 1580DT TURBO FIAT DIESEL ALSO HESSTON 1580 TURBO FIAT DIESEL 12 SPEED

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—1081 rpm)** | | | | | | | | |
| 141.44<br>(105.47) | 2200 | 8.374<br>(31.699) | 0.413<br>(0.251) | 16.89<br>(3.327) | 176<br>(80.0) | 67<br>(19.4) | 75<br>(23.9) | 29.245<br>(98.759) |
| **Standard Power Take-off Speed (1000 rpm)—One Hour** | | | | | | | | |
| 136.14<br>(101.52) | 2075 | 7.878<br>(29.821) | 0.405<br>(0.246) | 17.28<br>(3.404) | 179<br>(81.5) | 67<br>(19.4) | 74<br>(23.3) | 29.210<br>(98.638) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 124.33<br>(92.71) | 2276 | 7.666<br>(29.019) | 0.430<br>(0.261) | 16.22<br>(3.195) | 177<br>(80.6) | 67<br>(19.4) | 74<br>(23.3) | ......<br>...... |
| 0.00<br>(0.00) | 2438 | 2.626<br>(9.940) | .....<br>..... | .....<br>..... | 174<br>(78.9) | 67<br>(19.4) | 74<br>(23.3) | ......<br>...... |
| 64.69<br>(48.24) | 2568 | 5.115<br>(19.355) | 0.551<br>(0.335) | 12.65<br>(2.492) | 176<br>(79.7) | 66<br>(19.2) | 74<br>(23.6) | ......<br>...... |
| 142.10<br>(105.96) | 2200 | 8.419<br>(31.869) | 0.413<br>(0.251) | 16.88<br>(3.325) | 180<br>(81.9) | 68<br>(20.0) | 75<br>(23.9) | ......<br>...... |
| 32.77<br>(24.44) | 2599 | 3.852<br>(14.581) | 0.819<br>(0.498) | 8.51<br>(1.676) | 174<br>(78.6) | 68<br>(20.0) | 75<br>(23.9) | ......<br>...... |
| 95.16<br>(70.96) | 2522 | 6.349<br>(24.034) | 0.465<br>(0.283) | 14.99<br>(2.952) | 177<br>(80.6) | 68<br>(20.3) | 75<br>(23.9) | ......<br>...... |
| Av 76.51<br>Av (57.05) | 2434 | 5.671<br>(21.467) | 0.517<br>(0.314) | 13.49<br>(2.658) | 176<br>(80.0) | 68<br>(19.8) | 75<br>(23.7) | 29.183<br>(98.548) |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Disengaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 122.32<br>(91.21) | 8395<br>(37.34) | 5.46<br>(8.79) | 2200 | 5.09 | 8.321<br>(31.500) | 0.474<br>(0.288) | 14.70<br>(2.896) | 179<br>(81.4) | 58<br>(14.4) | 68<br>(20.0) | 29.075<br>(98.182) |
| **75% of Pull at Maximum Power—Ten Hours 7th (M3) Gear** | | | | | | | | | | | |
| 99.03<br>(73.84) | 6377<br>(28.37) | 5.82<br>(9.37) | 2311 | 3.64 | 7.317<br>(27.698) | 0.515<br>(0.313) | 13.53<br>(2.666) | 176<br>(79.8) | 48<br>(8.7) | 53<br>(11.4) | 29.150<br>(98.435) |
| **50% of Pull at Maximum Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 68.29<br>(50.93) | 4251<br>(18.91) | 6.02<br>(9.70) | 2362 | 2.41 | 5.954<br>(22.539) | 0.608<br>(0.370) | 11.47<br>(2.259) | 175<br>(79.3) | 44<br>(6.7) | 47<br>(8.1) | 29.205<br>(98.621) |
| **50% of Pull at Reduced Engine Speed—Two Hours 9th (H1) Gear** | | | | | | | | | | | |
| 68.38<br>(50.99) | 4251<br>(18.91) | 6.03<br>(9.71) | 1490 | 2.41 | 4.645<br>(17.583) | 0.473<br>(0.288) | 14.72<br>(2.900) | 175<br>(79.4) | 51<br>(10.6) | 58<br>(14.4) | 29.275<br>(98.857) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 109.18<br>(81.41) | 15342<br>(68.24) | 2.67<br>(4.29) | 2206 | 14.86 | 4th (L4) Gear | | | 176<br>(80.0) | 47<br>(8.3) | 49<br>(9.4) | 29.120<br>(98.334) |
| 121.01<br>(90.24) | 13271<br>(59.03) | 3.42<br>(5.50) | 2198 | 9.37 | 5th (M1) Gear | | | 180<br>(81.9) | 55<br>(12.8) | 61<br>(16.1) | 29.110<br>(98.300) |
| 123.95<br>(92.43) | 10435<br>(46.41) | 4.45<br>(7.17) | 2200 | 6.45 | 6th (M2) Gear | | | 179<br>(81.7) | 54<br>(12.2) | 59<br>(15.0) | 29.110<br>(98.300) |
| 124.15<br>(92.58) | 8502<br>(37.82) | 5.48<br>(8.81) | 2201 | 5.01 | 7th (M3) Gear | | | 178<br>(80.8) | 51<br>(10.6) | 56<br>(13.3) | 29.120<br>(98.334) |
| 123.24<br>(91.90) | 6936<br>(30.85) | 6.66<br>(10.72) | 2200 | 4.04 | 8th (M4) Gear | | | 178<br>(81.1) | 56<br>(13.3) | 62<br>(16.7) | 29.110<br>(98.300) |
| 121.67<br>(90.73) | 5187<br>(23.07) | 8.80<br>(14.16) | 2199 | 3.13 | 9th (H1) Gear | | | 177<br>(80.6) | 57<br>(13.9) | 64<br>(17.8) | 29.110<br>(98.300) |

**Department of Agricultural Engineering**

**Dates of Test:** September 13-23, 1982

**Manufacturer:** FIAT TRATTORI S.p.A. Via Pico della Mirandola 72-41100, Modena, Italy

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8371 **Fuel weight** 6.970 lbs/gal *(0.835 kg/l)* **Oil SAE** 30 **API service classification** SE-SF/CC-CD **To motor** 4.047 gal *(15.321 l)* **Drained from motor** 3.438 gal *(13.014 l)* **Transmission and final drive lubricant** API 303 **Total time engine was operated** 38.5 hours.

**ENGINE: Make** Fiat Diesel **Type** six cylinder vertical with turbocharger **Serial No.** OM8365.25.501*750889 **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.528" × 5.118" *(115 mm × 130 mm)* **Compression ratio** 15.5 to 1 **Displacement** 494 cu in *(8102 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with centrifugal precleaner **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil **Fuel filter** one felt element and one paper cartridge **Muffler** vertical **Cooling medium temperature control** one thermostat.

**CHASSIS: Type** front wheel assist with duals **Serial No.** 1580 DT/12*742411* **Tread width** rear 64.6" *(1640 mm)* to 121" *(3075 mm)* front 74.8" *(1900 mm)* to 86.6" *(2200 mm)* **Wheel base** 113.6" *(2885 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 37.2" *(945 mm)* Vertical distance above roadway 42.5" *(1080 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.5 *(2.3)* second 1.9 *(3.1)* third 2.3 *(3.7)* fourth 2.8 *(4.5)* fifth 3.5 *(5.7)* sixth 4.4 *(7.1)* seventh 5.4 *(8.6)* eighth 6.5 *(10.4)* ninth 8.5 *(13.6)* tenth 10.6 *(17.1)* eleventh 12.9 *(20.7)* twelfth 15.5 *(25.0)* reverse 3.6 *(5.8)*, 4.5 *(7.2)*, 5.5 *(8.8)*, 6.6 *(10.6)* **Clutch** single dry disc hydraulically actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 225" *(5.72 m)* left 233" *(5.91 m)* (on concrete surface without brake) right 265" *(6.72 m)* left 267" *(6.77 m)* **Turning space diameter** (on concrete surface with brake applied) right 467" *(11.87 m)* left 482" *(12.25 m)* (on concrete surface without brake) right 546" *(13.87 m)* left 550" *(13.97 m)* **Power take-off** 540 rpm at 1950 engine rpm and 1000 rpm at 2075 engine rpm.

## LUGGING ABILITY IN 7th (M3) GEAR

| Crankshaft Speed rpm | 2201 | 1972 | 1754 | 1537 | 1306 | 1111 |
|---|---|---|---|---|---|---|
| Pull—lbs<br>(kN) | 8502<br>(37.82) | 9040<br>(40.21) | 9406<br>(41.84) | 9609<br>(42.74) | 9533<br>(42.40) | 8646<br>(38.46) |
| Increase in Pull % | 0 | 6 | 11 | 13 | 12 | 2 |
| Power—Hp<br>(kW) | 124.15<br>(92.58) | 117.72<br>(87.79) | 109.70<br>(81.80) | 97.06<br>(72.37) | 81.79<br>(60.99) | 63.51<br>(47.36) |
| Speed—Mph<br>(km/h) | 5.48<br>(8.81) | 4.88<br>(7.86) | 4.33<br>(6.97) | 3.79<br>(6.10) | 3.22<br>(5.18) | 2.75<br>(4.43) |
| Slip % | 5.01 | 5.33 | 5.49 | 5.65 | 5.66 | 5.17 |

| TRACTOR SOUND LEVEL WITH CAB | dB(A) | Front Wheel Drive Disengaged dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 82.0 | 81.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 81.0 |
| 50% of Pull at Maximum Power—Two Hours | | 80.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 76.5 |
| Bystander in 12th (H4) gear | | 88.0 |

## DRAWBAR PERFORMANCE
### (Front Wheel Drive Engaged)

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cooling med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 7th (M3) Gear** | | | | | | | | | | | |
| 123.06<br>(91.76) | 8283<br>(36.84) | 5.57<br>(8.97) | 2200 | 3.82 | 8.321<br>(31.500) | 0.471<br>(0.287) | 14.79<br>(2.913) | 178<br>(81.1) | 67<br>(19.6) | 70<br>(21.1) | 29.020<br>(97.996) |
| **MAXIMUM POWER IN SELECTED GEARS** | | | | | | | | | | | |
| 108.16<br>(80.65) | 18187<br>(80.90) | 2.23<br>(3.59) | 2273 | 14.71 | 3rd (L3) Gear | | | 178<br>(80.8) | 44<br>(6.7) | 44<br>(6.7) | 29.120<br>(98.334) |
| 125.09<br>(93.28) | 10302<br>(45.83) | 4.55<br>(7.33) | 2199 | 4.84 | 6th (M2) Gear | | | 177<br>(80.3) | 53<br>(11.7) | 58<br>(14.4) | 29.120<br>(98.334) |
| 124.27<br>(92.67) | 8365<br>(37.21) | 5.57<br>(8.97) | 2200 | 3.78 | 7th (M3) Gear | | | 176<br>(80.0) | 50<br>(10.0) | 55<br>(12.8) | 29.120<br>(98.334) |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| Rear Tires | —No., size, ply & psi (kPa) | Four 20.8-38; 8; 14 (97) | Four 20.8-38; 8; 14 (97) |
| Ballast | —Liquid (each inner) | 1150 lb (522 kg) | None |
| | —Cast Iron (each) | None | None |
| Front Tires | —No., size, ply & psi (kPa) | Two 16.9-28; 6; 18 (123) | Two 16.9-28; 6; 18 (123) |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | 80 lb (36 kg) | None |
| Height of Drawbar | | 23 in (585 mm) | 23 in (585 mm) |
| Static Weight with Operator—Rear | | 13440 lb (6096 kg) | 11160 lb (5062 kg) |
| Front | | 5620 lb (2549 kg) | 5460 lb (2477 kg) |
| Total | | 19060 lb (8645 kg) | 16620 lb (7539 kg) |

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 122°F *(50.0°C)*. Six gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1451.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

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University of Nebraska-Lincoln
Irvin T. Omtvedt, Dean and Director

# NEBRASKA TRACTOR TEST 1452 — STEIGER COUGAR III ST-250 DIESEL 20 SPEED (SERIAL NUMBERS 104-00331 AND UP)

## DRAWBAR PERFORMANCE AT 2100 RPM

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | Fuel Consumption lb/hp.hr (kg/kW.h) | Fuel Consumption Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 211.29<br>(157.56) | 12961<br>(57.65) | 6.11<br>(9.83) | 2100 | 2.72 | 13.931<br>(52.734) | 0.460<br>(0.280) | 15.16<br>(2.987) | 179<br>(81.7) | 52<br>(10.8) | 56<br>(13.3) | 29.105<br>(98.285) |
| **75% of Pull at Maximum Power—Ten Hours 11th Gear** | | | | | | | | | | | |
| 180.36<br>(134.22) | 9936<br>(44.20) | 6.34<br>(10.20) | 2184 | 2.26 | 11.758<br>(44.508) | 0.484<br>(0.295) | 14.40<br>(2.836) | 180<br>(82.3) | 68<br>(20.1) | 75<br>(24.0) | 28.518<br>(96.301) |
| **50% of Pull at Maximum Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 115.54<br>(86.16) | 6625<br>(29.47) | 6.54<br>(10.53) | 2222 | 1.61 | 9.054<br>(34.273) | 0.546<br>(0.332) | 12.76<br>(2.514) | 180<br>(82.2) | 62<br>(16.7) | 72<br>(22.2) | 28.530<br>(96.479) |
| **50% of Pull at Reduced Engine Speed—Two Hours 14th Gear** | | | | | | | | | | | |
| 115.45<br>(86.09) | 6625<br>(29.47) | 6.53<br>(10.51) | 1515 | 1.60 | 7.584<br>(28.708) | 0.458<br>(0.279) | 15.22<br>(2.998) | 180<br>(81.9) | 64<br>(17.5) | 75<br>(23.9) | 28.500<br>(96.443) |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 185.40<br>(138.25) | 29539<br>(131.39) | 2.35<br>(3.79) | 2150 | 14.48 | 4th Gear | 179<br>(81.4) | 51<br>(10.6) | 53<br>(11.7) | 28.610<br>(96.814) |
| 188.49<br>(140.56) | 26866<br>(119.51) | 2.77<br>(4.46) | 2099 | 9.02 | 5th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 29.000<br>(97.929) |
| 203.25<br>(151.56) | 23679<br>(105.33) | 3.22<br>(5.18) | 2099 | 6.64 | 6th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 29.000<br>(97.929) |
| 210.87<br>(157.25) | 21420<br>(95.28) | 3.69<br>(5.94) | 2101 | 5.19 | 7th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 29.010<br>(97.962) |
| 212.58<br>(158.52) | 19002<br>(84.53) | 4.20<br>(6.75) | 2100 | 4.40 | 8th Gear | 180<br>(81.9) | 55<br>(12.8) | 62<br>(16.7) | 29.050<br>(98.098) |
| 215.04<br>(160.35) | 16952<br>(75.41) | 4.76<br>(7.66) | 2101 | 3.77 | 9th Gear | 180<br>(81.9) | 55<br>(12.8) | 62<br>(16.7) | 29.050<br>(98.097) |
| 215.33<br>(160.57) | 14989<br>(66.67) | 5.39<br>(8.67) | 2101 | 3.13 | 10th Gear | 180<br>(81.9) | 55<br>(12.8) | 62<br>(16.7) | 29.060<br>(98.131) |
| 215.96<br>(161.04) | 13248<br>(58.93) | 6.11<br>(9.84) | 2105 | 2.81 | 11th Gear | 180<br>(82.2) | 54<br>(12.2) | 61<br>(16.1) | 29.070<br>(98.165) |
| 214.35<br>(159.84) | 11653<br>(51.80) | 6.89<br>(11.09) | 2100 | 2.64 | 12th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 28.990<br>(97.895) |
| 214.12<br>(159.67) | 10055<br>(44.73) | 7.99<br>(12.85) | 2098 | 2.15 | 13th Gear | 180<br>(82.2) | 56<br>(13.3) | 64<br>(17.8) | 28.980<br>(97.861) |
| 212.49<br>(158.45) | 8844<br>(39.34) | 9.01<br>(14.50) | 2098 | 2.07 | 14th Gear | 180<br>(82.2) | 56<br>(13.3) | 64<br>(17.8) | 28.970<br>(97.827) |

### LUGGING ABILITY IN 11th GEAR

| | | | | | | |
|---|---|---|---|---|---|---|
| Crankshaft Speed rpm | 2105 | 1886 | 1674 | 1469 | 1247 | 1047 |
| Pull—lbs (kN) | 13248<br>(58.93) | 16256<br>(72.31) | 16964<br>(75.46) | 18119<br>(80.60) | 18085<br>(80.45) | 16240<br>(72.24) |
| Increase in Pull % | 0 | 23 | 28 | 37 | 37 | 23 |
| Power—Hp (kW) | 215.96<br>(161.04) | 236.03<br>(176.01) | 218.24<br>(162.74) | 203.71<br>(151.90) | 172.60<br>(128.71) | 130.83<br>(97.56) |
| Speed—Mph (km/h) | 6.11<br>(9.84) | 5.44<br>(8.76) | 4.82<br>(7.76) | 4.22<br>(6.79) | 3.58<br>(5.76) | 3.02<br>(4.86) |
| Slip % | 2.81 | 3.45 | 3.61 | 4.09 | 4.09 | 3.61 |

| TRACTOR SOUND LEVEL WITH CAB | 1700 RPM dB(A) | 2100 RPM dB(A) |
|---|---|---|
| Maximum Available Power—Two Hours | 76.0 | 77.0 |
| 75% of Pull at Maximum Power—Ten Hours | | 77.0 |
| 50% of Pull at Maximum Power—Two Hours | | 76.5 |
| 50% of Pull at Reduced Engine Speed—Two Hours | | 75.5 |
| Bystander in 20th gear | | 100.5 |

**Department of Agricultural Engineering**

**Dates of Test:** September 21 to October 1, 1982

**Manufacturer:** STEIGER TRACTOR, INC., 406 Main Avenue, Fargo, North Dakota 58126

**FUEL, OIL AND TIME:** **Fuel** No. 2 Diesel **Cetane No.** 46.6 (rating taken from oil company's inspection data) **Specific gravity converted to 60°/60°** *(15°/15°)* 0.8373 **Fuel weight** 6.972 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W-40 **API service classification** CD, CC, SF **To motor** 5.531 gal *(20.938 l)* **Drained from motor** 4.840 gal *(18.323 l)* **Transmission and hydraulic lubricant** SAE 10 hydraulic oil **Final drive lubricant** SAE 85W90 **Total time engine was operated** 32.5 hours.

**ENGINE:** **Make** Caterpillar Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 64Z00713 **Crankshaft** lengthwise **Rated rpm** 1700 to 2100 **Bore and stroke** 4.75" × 6.0" *(121 mm × 152 mm)* **Compression ratio** 15.0 to 1 **Displacement** 638 cu in *(10455 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements with aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for transmission and transfer case oil, radiator for hydraulic oil **Fuel filter** one paper cartridge **Muffler** none **Cooling medium temperature control** one thermostat.

**CHASSIS:** **Type** four wheel drive with duals **Serial No.** 104-02001 82 **Tread width** rear 79.0" *(2007 mm)* to 136.4" *(3464 mm)* front 79.0" *(2007 mm)* to 136.4" *(3464 mm)* **Wheel base** 128" *(3251 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 74.2" *(1885 mm)* Vertical distance above roadway 44.6" *(1132 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph (km/h)** first 1.8 *(2.9)* second 2.0 *(3.3)* third 2.3 *(3.7)* fourth 2.6 *(4.2)* fifth 3.0 *(4.8)* sixth 3.3 *(5.4)* seventh 3.8 *(6.1)* eighth 4.2 *(6.8)* ninth 4.8 *(7.7)* tenth 5.4 *(8.6)* eleventh 6.1 *(9.8)* twelfth 6.8 *(11.0)* thirteenth 7.9 *(12.7)* fourteenth 8.8 *(14.2)* fifteenth 10.1 *(16.2)* sixteenth 11.3 *(18.1)* seventeenth 12.6 *(20.3)* eighteenth 14.1 *(22.7)* nineteenth 16.0 *(25.8)* twentieth 17.9 *(28.8)* reverse 1.8 *(2.9)*, 2.0 *(3.3)*, 2.3 *(3.7)*, 2.6 *(4.2)* **Clutch** multiple dry disc hydraulically operated by foot pedal **Brakes** multiple dry disc hydraulically operated by foot pedal or mechanically by hand lever **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 283" *(7.19 m)* left 288" *(7.32 m)* **Turning space diameter** (on concrete surface without brake) right 590" *(14.99 m)* left 600" *(15.24 m)* **Power take-off** none.

## DRAWBAR PERFORMANCE AT 1700 RPM

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | Fuel Consumption lb/hp.hr (kg/kW.h) | Fuel Consumption Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Temp. °F (°C) Air wet bulb | Temp. °F (°C) Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours 11th Gear** | | | | | | | | | | | |
| 214.51<br>(159.96) | 16447<br>(73.16) | 4.89<br>(7.87) | 1700 | 3.85 | 13.429<br>(50.833) | 0.436<br>(0.265) | 15.97<br>(3.147) | 180<br>(81.9) | 58<br>(14.4) | 64<br>(17.8) | 28.670<br>(96.814) |

### MAXIMUM POWER IN SELECTED GEARS

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Gear | Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| 208.50<br>(155.48) | 29481<br>(131.14) | 2.65<br>(4.27) | 1690 | 14.67 | 6th Gear | 179<br>(81.4) | 53<br>(11.7) | 56<br>(13.3) | 28.660<br>(96.781) |
| 204.27<br>(152.32) | 26626<br>(118.44) | 2.88<br>(4.63) | 1705 | 9.05 | 7th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 29.010<br>(97.962) |
| 208.74<br>(155.66) | 23514<br>(104.59) | 3.33<br>(5.36) | 1700 | 6.26 | 8th Gear | 180<br>(82.2) | 55<br>(12.8) | 63<br>(17.2) | 29.030<br>(97.996) |
| 216.87<br>(161.72) | 21417<br>(95.27) | 3.80<br>(6.11) | 1702 | 5.19 | 9th Gear | 180<br>(82.2) | 55<br>(12.8) | 62<br>(16.7) | 29.040<br>(98.064) |
| 217.35<br>(162.08) | 18905<br>(84.09) | 4.31<br>(6.94) | 1700 | 4.33 | 10th Gear | 180<br>(82.2) | 55<br>(12.8) | 62<br>(16.7) | 29.050<br>(98.097) |
| 218.30<br>(162.78) | 16715<br>(74.35) | 4.90<br>(7.88) | 1699 | 3.77 | 11th Gear | 180<br>(82.2) | 55<br>(12.8) | 62<br>(16.7) | 29.060<br>(98.131) |
| 218.45<br>(162.90) | 14774<br>(65.72) | 5.54<br>(8.92) | 1702 | 3.29 | 12th Gear | 180<br>(82.2) | 55<br>(12.8) | 64<br>(17.8) | 28.990<br>(97.895) |
| 217.59<br>(162.25) | 12688<br>(56.44) | 6.43<br>(10.35) | 1701 | 2.72 | 13th Gear | 180<br>(82.2) | 56<br>(13.3) | 64<br>(17.8) | 28.980<br>(97.861) |
| 216.95<br>(161.78) | 11205<br>(49.84) | 7.26<br>(11.69) | 1699 | 2.40 | 14th Gear | 180<br>(82.2) | 56<br>(13.3) | 64<br>(17.8) | 28.970<br>(97.827) |
| 216.40<br>(161.37) | 9853<br>(43.83) | 8.24<br>(13.25) | 1702 | 2.07 | 15th Gear | 180<br>(82.2) | 56<br>(13.3) | 64<br>(17.8) | 28.960<br>(97.794) |

| TIRES, BALLAST AND WEIGHT | | Tested Without Ballast |
|---|---|---|
| Rear Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(83)* |
| Ballast | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Front Tires | —No., size, ply & psi *(kPa)* | Four 23.1-34; 8; inner 14 *(95)* outer 12 *(83)* |
| Ballast | —Liquid (each) | None |
| | —Cast Iron (each) | None |
| Height of Drawbar | | 17 in *(430 mm)* |
| Static Weight with Operator | —Rear | 12575 lb *(5704 kg)* |
| | Front | 17390 lb *(7888 kg)* |
| | Total | 29965 lb *(13592 kg)* |

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 132°F *(55.6°C)*. Eleven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to tractor chassis Serial No. 104-00331 and higher.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1452.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Irvin T. Omtvedt, Dean and Director

# Nebraska Tractor Tests Summarized (Tests from 1973 through 1982)

| | | | | | | ENGINE | | | | | | | | | —FUEL CONSUMPTION (HP Hours Per Gallon) @:— | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | —Varying Drawbar Power— | | |
| MAKE AND MODEL OF TRACTOR | Test No. | Fuel Used | Weight With Ballast | Lbs. Ballast Carried | No. of Cyl-inders | Bore and Stroke | Dis-place-ment Cu. in. | Rated RPM Dwbr. | Max. PTO HP @ Rated Engine RPM | Std. PTO RPM | Max. PTO HP @ Std. PTO RPM | Max. Draw-bar HP | MPH @ Max. Dwbr. HP | Max. Lbs. Pull | Max. PTO HP @ Std. PTO RPM | PTO Average @ Varying Power | Max. Avail-able Power | 75% of Pull Max. Power | 50% of Pull @ Max. Power |
| **Allis-Chalmers** | | | | | | | | | | | | | | | | | | | |
| 175 | 1156 | Gas. | 8400 | 2010 | 4 | 4.000x4.500 | 226 | 1800 | 60.88 | 540 | 56.02 | 53.17 | 5.50 | 6875 | 11.78 | 9.44 | 10.22 | 9.64 | 8.20 |
| 5020 | 1270 | Die. | 3358 | 1298 | 2 | 3.62x3.74 | 77 | 2500 | 21.79 | 540 | 20.78 | 18.05 | 5.74 | 2346 | 13.99 | 10.99 | 11.07 | 10.51 | 8.62 |
| 5030 | 1271 | Die. | 3876 | 1346 | 2 | 3.82x3.94 | 90.1 | 2500 | 26.42 | 540 | 25.61 | 23.92 | 4.26 | 3389 | 13.82 | 11.28 | 11.64 | 11.48 | 9.68 |
| 5040 | 1230 | Die. | 6240 | 2180 | 3 | 3.740x4.330 | 143 | 2400 | 40.05 | 540 | 36.69 | 35.86 | 5.00 | 4837 | 15.47 | 11.80 | 12.58 | 12.74 | 10.44 |
| 5050 Diesel | 1240 | Die. | 7690 | 3280 | 3 | 4.055x4.330 | 168 | 2700 | 51.46 | 540 | 47.16 | 45.22 | 5.68 | 6075 | 16.10 | 12.42 | 12.58 | 13.01 | 11.24 |
| 6060 8 Speed | 1397 | Die. | 8945 | 2480 | 4 | 3.876x4.250 | 200 | 2300 | 63.83 | 540 | 64.90 | 52.24 | 4.83 | 6846 | 16.26 | 12.07 | 13.27 | 11.99 | 10.10 |
| 6080 12 Speed | 1398 | Die. | 11790 | 4200 | 4 | 3.876x4.25 | 200 | 2300 | 83.66 | 1000 | 74.49 | 72.32 | 5.74 | 9003 | 15.70 | 13.14 | 14.27 | 12.81 | 10.93 |
| 6140 Diesel | 1445 | Die. | 6195 | 1735 | 3 | 3.858x4.055 | 142 | 2500 | 41.08 | 541 | 38.04 | 33.97 | 5.20 | 4768 | 13.47 | 10.20 | 10,87 | 10.25 | 8.88 |
| 7000PS Diesel | 1195 | Die. | 12580 | 3030 | 6 | 3.875x4.250 | 301 | 2200 | 106.44 | 1000 | 105.85 | 92.64 | 6.08 | 9907 | 15.70 | 12.21 | 13.21 | 12.27 | 10.16 |
| 7010PD Die. 20 Speed | 1345 | Die. | 12790 | 1530 | 6 | 3.875x4.25 | 301 | 2300 | 106.53 | 1000 | 107.52 | 91.44 | 6.05 | 9426 | 15.48 | 11.57 | 12.59 | 11.48 | 9.68 |
| 7010PS Die. 12 Speed | 1346 | Die. | 12740 | 1365 | 6 | 3.875x4.25 | 301 | 2300 | 106.72 | 1000 | 106.33 | 91.61 | 6.11 | 9516 | 15.43 | 11.74 | 12.43 | 11.35 | 9.58 |
| 7020 Power Shift | 1259 | Die. | 15610 | 3840 | 6 | 3.875x4.250 | 301 | 2300 | 123.79 | 1000 | 123.50 | 105.36 | 6.59 | 12001 | 16.01 | 12.45 | 13.10 | 12.25 | 10.34 |
| 7020 Power Director | 1260 | Die. | 15655 | 4085 | 6 | 3.875x4.250 | 301 | 2300 | 123.85 | 1000 | 125.51 | 107.36 | 6.63 | 11964 | 16.08 | 12.12 | 13.09 | 12.08 | 10.13 |
| 7030 Diesel | 1119 | Die. | 16560 | 4130 | 6 | 4.250x5.000 | 426 | 2300 | 130.98 | 1000 | 131.14 | 113.28 | 4.94 | 12610 | 15.45 | 11.76 | 12.92 | 11.90 | 9.91 |
| 7040 Diesel | 1166 | Die. | 17380 | 5585 | 6 | 4.250x5.000 | 426 | 2300 | 136.49 | 1000 | 136.26 | 117.12 | 4.77 | 13619 | 15.35 | 11.78 | 12.94 | 11.86 | 9.80 |
| 7040PS Diesel | 1196 | Die. | 17355 | 4977 | 6 | 4.250x5.000 | 426 | 2300 | 136.30 | 1000 | 136.15 | 117.75 | 4.61 | 13547 | 15.51 | 11.95 | 13.05 | 12.29 | 10.39 |
| 7045 Power Director | 1261 | Die. | 18980 | 4745 | 6 | 4.250x5.000 | 426 | 2300 | 146.18 | 1000 | 146.46 | 127.84 | 7.04 | 15430 | 14.62 | 11.26 | 12.16 | 11.40 | 9.72 |
| 7045 Powershift Diesel | 1308 | Die. | 18990 | 4390 | 6 | 4.25x5.00 | 426 | 2300 | 146.88 | 1000 | 146.67 | 127.61 | 6.92 | 15449 | 14.92 | 11.32 | 12.58 | 11.71 | 9.62 |
| 7050 Diesel | 1120 | Die. | 19530 | 5005 | 6 | 4.250x5.000 | 426 | 2300 | 156.49 | 1000 | 156.63 | 135.11 | 5.47 | 16206 | 16.04 | 12.69 | 13.47 | 12.67 | 10.53 |
| 7060 Diesel | 1167 | Die. | 20490 | 6500 | 6 | 4.250x5.000 | 426 | 2300 | 161.51 | 1000 | 160.44 | 140.59 | 6.94 | 17370 | 15.99 | 12.71 | 13.63 | 12.75 | 10.55 |
| 7060PS Diesel | 1197 | Die. | 20560 | 5915 | 6 | 4.250x5.000 | 426 | 2300 | 161.42 | 1000 | 161.65 | 144.13 | 4.92 | 17851 | 16.08 | 12.76 | 13.80 | 12.98 | 10.79 |
| 7080 Diesel | 1168 | Die. | 21720 | 7115 | 6 | 4.250x5.000 | 426 | 2550 | 181.51 | 996 | 181.51 | 153.78 | 4.58 | 18478 | 15.71 | 12.24 | 13.23 | 12.11 | 10.02 |
| 7580 4WD | 1229 | Die. | 25000 | 1490 | 6 | 4.250x5.000 | 426 | 2550 | 186.35 | 996 | 186.35 | 160.79 | 6.91 | 23310 | 14.81 | 11.47 | 12.22 | 11.39 | 9.40 |
| 8010 Powershift | 1446 | Die. | 13185 | 555 | 6 | 3.875x4.25 | 301 | 2300 | 107.38 | 1000 | 109.55 | 93.01 | 6.16 | 9102 | 15.01 | 11.49 | 12.57 | 11.48 | 9.54 |
| 8030 Powershift | 1447 | Die. | 17100 | 2085 | 6 | 4.25x5.00 | 426 | 2300 | 133.75 | 1000 | 134.42 | 116.65 | 6.35 | 13348 | 15.25 | 11.78 | 12.93 | 11.87 | 10.00 |
| 8050 Powershift | 1448 | Die. | 19380 | 4075 | 6 | 4.25z5.00 | 426 | 2300 | 152.40 | 1000 | 155.15 | 134.13 | 4.89 | 16728 | 15.88 | 12.51 | 13.71 | 12.73 | 10.80 |
| 8070 Powershift | 1449 | Die. | 22370 | 5520 | 6 | 4.25x5.00 | 426 | 2400 | 170.72 | 1000 | 171.44 | 147.29 | 5.87 | 18777 | 16.48 | 12.81 | 13.67 | 12.59 | 10.64 |
| 8550 Diesel | 1262 | Die. | 29360 | 2320 | 6 | 5.250x5.625 | 731 | 2500 | 253.88 | 998 | 253.88 | 224.18 | 5.83 | 26220 | 14.57 | 10.94 | 12.47 | 11.45 | 9.35 |
| **Belarus** | | | | | | | | | | | | | | | | | | | |
| MTZ 80 Diesel | 1139 | Die. | 11575 | 3735 | 4 | 4.331x4.921 | 290 | 2200 | 74.79 | 1000 | 73.88 | 65.64 | 5.08 | 8141 | 15.30 | 13.07 | 13.12 | 13.12 | 11.32 |
| 250 Diesel | 1183 | Die. | 5490 | 939 | 2 | 4.134x4.724 | 127 | 1800 | 24.95 | 540 | 25.02 | 21.81 | 4.54 | 2280 | 15.56 | 13.23 | 13.19 | 13.20 | 11.80 |
| T25A Diesel | 1200 | Die. | 5490 | 939 | 2 | 4.134x4.724 | 127 | 1800 | 28.70 | 540 | 28.15 | 24.46 | 4.51 | 2570 | 13.95 | 13.46 | 12.21 | 13.48 | 11.94 |
| 1500 Diesel 12 Speed | 1333 | Die. | 19885 | 1120 | 6 | 5.118x4.528 | 558 | 2100 | 168.76 | 1000 | 169.63 | 151.96 | 5.31 | 19311 | 16.48 | 13.69 | 14.53 | 13.98 | 12.25 |
| 7100 Diesel 16 Speed | 1334 | Die. | 32460 | None | 12 | 5.118x5.512 | 1360 | 1900 | 269.62 | 1003 | 269.62 | 259.46 | 4.78 | 30845 | 15.85 | 13.26 | 14.82 | 14.35 | 12.56 |
| **Big Bud** | | | | | | | | | | | | | | | | | | | |
| 525/50 9 Speed | 1400 | Die. | 51920 | None | 6 | 6.25x6.25 | 1150 | 2100 | .... | .... | .... | 421.49 | 5.64 | 42216 | .... | .... | 14.87 | 13.97 | 12.01 |
| **David Brown** | | | | | | | | | | | | | | | | | | | |
| 885 Gasoline | 1143 | Gas. | 6550 | 2530 | 3 | 3.939x4.000 | 146.1 | 2200 | 39.26 | 1000† | 37.26 | 32.92 | 4.61 | 5308 | 10.96 | 8.19 | 7,55 | 7.00 | 7.21 |
| 885 Diesel | 1137 | Die. | 6480 | 2125 | 3 | 3.939x4.500 | 164.4 | 2200 | 43.20 | 1000† | 40.87 | 37.16 | 4.57 | 5135 | 16.61 | 14.03 | 13.85 | 13.73 | 12.67 |
| 990 Diesel | 1144 | Die. | 9350 | 4690 | 4 | 3.939x4.000 | 194.9 | 2200 | 53.77 | 1000† | 50.48 | 46.34 | 5.54 | 7335 | 15.53 | 13.23 | 13.37 | 12.91 | 11.14 |
| 995 Diesel | 1136 | Die. | 9475 | 4325 | 4 | 3.939x4.500 | 219 | 2200 | 58.77 | 1000† | 55.33 | 50.42 | 5.44 | 7317 | 16.60 | 13.94 | 13.78 | 13.60 | 12.40 |
| 1210 Diesel | 1142 | Die. | 10440 | 4640 | 4 | 3.939x4.500 | 219 | 2300 | 65.98 | 1000† | 59.40 | 57.23 | 6.16 | 8097 | 16.40 | 14.43 | 13.61 | 14.36 | 12.93 |
| 1212 Diesel | 1138 | Die. | 10435 | 4030 | 4 | 3.939x4.500 | 219 | 2300 | 65.36 | 1000† | 58.25 | 54.10 | 6.92 | 8137 | 15.35 | 13.84 | 12.56 | 13.27 | 11.82 |
| **Case** | | | | | | | | | | | | | | | | | | | |
| 870 Manual Diesel | 1149 | Die. | 13510 | 3435 | 4 | 4.625x5.000 | 336 | 2100 | 80.20 | 1000 | 77.93 | 71.09 | 5.23 | 10047 | 14.52 | 12.13 | 12.42 | 12.53 | 10.88 |
| 870 Power Shift | 1150 | Die. | 13760 | 3665 | 4 | 4.625x5.000 | 336 | 2100 | 80.49 | 1000 | 76.52 | 71.04 | 4.39 | 10030 | 13.64 | 11.60 | 11.49 | 12.04 | 10.60 |
| 1190 Manual | 1378 | Die. | 6780 | 2160 | 3 | 3.939x4.500 | 165 | 2200 | 43.09 | 540 | 38.54 | 36.60 | 7.60 | 4620 | 14.99 | 13.09 | 12.22 | 12.59 | 11.39 |
| 1270 | 1160 | Die. | 18910 | 3440 | 6 | 4.375x5.000 | 451 | 2100 | 135.39 | 1000 | 135.41 | 121.83 | 6.46 | 15648 | 14.23 | 11.14 | 12.16 | 11.49 | 9.88 |
| 1290 Manual | 1379 | Die. | 9320 | 2750 | 4 | 3.939x4.000 | 195 | 2200 | 53.73 | 540 | 47.80 | 46.41 | 4.97 | 6851 | 15.20 | 13.34 | 12.41 | 12.90 | 11.68 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1370 Diesel | 1148 | Die. | 20290 | 4945 | 6 | 4.625x5.000 | 504 | 2200 | 155.56 | 1000 | 156.32 | 134.25 | 5.00 | 16480 | 15.01 | 10.95 | 12.04 | 10.91 | 9.11 |
| 1390 Manual | 1380 | Die. | 9780 | 3160 | 4 | 3.939x4.500 | 219 | 2200 | 60.59 | 1000 | 58.40 | 52.16 | 4.92 | 7348 | 15.58 | 13.36 | 12.89 | 13.24 | 11.77 |
| 1410 Manual | 1209 | Die. | 10910 | 3160 | 4 | 3.939x4.500 | 219 | 2300 | 80.88 | 540 | 79.35 | 69.25 | 5.32 | 7846 | 17.47 | 14.69 | 14.20 | 14.38 | 12.45 |
| 1410 Power Shift | 1210 | Die. | 10990 | 3150 | 4 | 3.939x4.500 | 219 | 2300 | 80.61 | 540 | 76.21 | 67.98 | 7.90 | 7815 | 16.86 | 13.76 | 13.34 | 13.21 | 11.45 |
| 1490 Manual | 1381 | Die. | 11305 | 3600 | 4 | 3.939x4.500 | 219 | 2200 | 70.51 | 1000 | 68.75 | 60.45 | 5.63 | 8340 | 17.18 | 13.62 | 13.82 | 13.00 | 11.25 |
| 1490 Powershift | 1382 | Die. | 11060 | 2635 | 4 | 3.939x4.500 | 219 | 2200 | 70.91 | 1000 | 70.48 | 61.56 | 6.76 | 8405 | 16.42 | 12.36 | 13.12 | 12.01 | 10.20 |
| 1570 | 1218 | Die. | 20350 | 4060 | 6 | 4.625x5.000 | 504 | 2100 | 180.41 | 1003 | 180.41 | 152.96 | 5.02 | 17115 | 15.09 | 12.47 | 12.72 | 12.46 | 10.99 |
| 1690 Manual (1) | 1383 | Die. | 12470 | 3715 | 6 | 3.939x4.500 | 329 | 2300 | 90.39 | 1000 | 87.76 | 78.08 | 4.27 | 10536 | 15.95 | 13.95 | 13.20 | 13.50 | 12.28 |
| 2090 Manual Diesel | 1304 | Die. | 15030 | 3120 | 6 | 4.625x5.000 | 504 | 2100 | 108.74 | 998 | 108.74 | 95.31 | 7.10 | 11655 | 15.40 | 12.23 | 13.41 | 12.69 | 10.73 |
| 2090 Power Shift | 1295 | Die. | 15190 | 3160 | 6 | 4.625x5.00 | 504 | 2100 | 108.29 | 998 | 108.29 | 93.95 | 6.56 | 11211 | 14.94 | 11.77 | 12.49 | 11.96 | 10.14 |
| 2290 Manual Diesel | 1296 | Die. | 15400 | 2630 | 6 | 4.625x5.000 | 504 | 2100 | 128.80 | 998 | 128.80 | 109.36 | 5.32 | 12635 | 14.52 | 11.66 | 12.46 | 11.73 | 10.07 |
| 2290 Powershift Diesel | 1297 | Die. | 15840 | 2140 | 6 | 4.625x5.000 | 504 | 2100 | 129.08 | 998 | 129.08 | 111.68 | 6.25 | 12749 | 14.52 | 11.53 | 12.65 | 11.37 | 9.77 |
| 2390 Powershift Diesel | 1302 | Die. | 18710 | 3120 | 6 | 4.625x5.000 | 504 | 2100 | 160.72 | 1002 | 160.72 | 146.01 | 6.59 | 16020 | 15.23 | 12.41 | 13.20 | 12.66 | 10.99 |
| 2590 Powershift Diesel | 1303 | Die. | 20500 | 4760 | 6 | 4.625x5.000 | 504 | 2100 | 180.38 | 1003 | 180.38 | 159.01 | 6.57 | 17865 | 15.53 | 12.97 | 13.42 | 13.03 | 11.67 |
| 2670 Diesel | 1165 | Die. | 25260 | 4450 | 6 | 4.625x5.000 | 504 | 2200 | 219.44 | 1008 | 219.44 | 194.60 | 5.28 | 23618 | 15.29 | 12.59 | 13.42 | 12.60 | 10.88 |
| 2870 Diesel | 1241 | Die. | 28150 | 3050 | 6 | 5.000x5.710 | 673 | 2200 | 252.10 | 1009 | 252.10 | 219.61 | 5.72 | 26386 | 15.45 | 12.01 | 12.98 | 12.37 | 10.40 |
| M-B 4/94 | 1211 | Die. | 13110 | 4620 | 6 | 3.819x5.039 | 346 | 2550 | 73.33 | 1000† | 70.17 | 66.33 | 5.33 | 10558 | 15.13 | 10.68 | 12.55 | 11.65 | 9.49 |
| 4490 Diesel | 1328 | Die. | 22450 | 1610 | 6 | 4.625x5.000 | 504 | 2200 | 175.20 | 1000 | 175.20 | 153.30 | 5.65 | 21400 | 15.27 | 12.36 | 13.30 | 12.52 | 10.87 |
| 4690 Diesel | 1329 | Die. | 25230 | 2920 | 6 | 4.625x5.000 | 504 | 2200 | 219.62 | 1000 | 219.62 | 195.60 | 5.97 | 24564 | 15.26 | 12.76 | 13.39 | 12.84 | 11.21 |
| 4890 Diesel | 1330 | Die. | 28460 | 2710 | 6 | 5.00x5.71 | 673 | 2200 | 253.41 | 1000 | 253.41 | 224.81 | 5.96 | 27627 | 16.32 | 13.02 | 14.19 | 13.27 | 11.36 |

(1) With mechanical front wheel drive.

**John Deere**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 830 Diesel | 1146 | Die. | 5714 | 1338 | 3 | 3.860x4.330 | 152 | 2400 | 35.30 | 540 | 32.62 | 28.46 | 5.19 | 4252 | 14.74 | 11.37 | 11.84 | 11.03 | 9.09 |
| 850 | 1280 | Die. | 3528 | 992 | 3 | 3.15x3.35 | 78 | 2600 | 22.27 | 540 | 20.66 | 18.92 | 4.90 | 2699 | 14.26 | 11.51 | 11.23 | 11.22 | 10.21 |
| 950 | 1281 | Die. | 3615 | 803 | 3 | 3.54x3.54 | 105 | 2400 | 27.36 | 540 | 28.05 | 23.46 | 4.98 | 3056 | 14.68 | 12.36 | 12.42 | 12.23 | 10.63 |
| 1050 Diesel | 1327 | Die. | 4140 | 730 | 3 | 3.54x3.54 | 105 | 2400 | 33.41 | 540 | 33.42 | 28.15 | 5.27 | 3466 | 15.46 | 12.36 | 12.34 | 11.99 | 10.13 |
| 1250 Diesel | 1437 | Die. | 5180 | 90 | 3 | 3.74x4.33 | 143 | 2500 | 40.70 | 540 | 40.98 | 34.01 | 5.39 | 3750 | 17.00 | 13.56 | 13.90 | 12.71 | 10.68 |
| 1530 Diesel | 1147 | Die. | 6863 | 1909 | 3 | 4.020x4.330 | 164 | 2500 | 45.38 | 540 | 41.36 | 38.86 | 5.58 | 5139 | 14.28 | 11.20 | 12.04 | 11.47 | 9.78 |
| 2040 Diesel | 1191 | Die. | 6420 | 1620 | 3 | 4.020x4.330 | 164 | 2500 | 40.86 | 540 | 37.62 | 34.15 | 5.64 | 4634 | 15.50 | 11.18 | 11.87 | 11.15 | 9.51 |
| 2040 Diesel 8 Speed | 1350 | Die. | 6500 | 1465 | 3 | 4.19x4.33 | 179 | 2500 | 41.25 | 540 | 40.53 | 33.31 | 5.63 | 4873 | 15.62 | 11.73 | 12.02 | 11.35 | 9.03 |
| 2040 8 Speed TSS (1) | 1393 | Die. | 6040 | 265 | 3 | 4.19x4.33 | 179 | 2500 | 40.44 | 540 | 40.22 | 33.21 | 5.16 | 5541 | 14.87 | 10.93 | 11.69 | 10.71 | 8.76 |
| 2240 Diesel | 1192 | Die. | 7340 | 2390 | 3 | 4.190x4.330 | 179 | 2500 | 50.37 | 540 | 46.78 | 41.28 | 5.54 | 5433 | 15.20 | 11.08 | 11.57 | 11.18 | 9.51 |
| 2240 8 Speed TSS (1) | 1394 | Die. | 6205 | 310 | 3 | 4.19x4.33 | 179 | 2500 | 50.90 | 540 | 49.20 | 42.13 | 5.08 | 5777 | 15.32 | 11.75 | 11.98 | 11.45 | 9.78 |
| 2630 | 1157 | Die. | 8430 | 2630 | 4 | 4.190x5.000 | 276 | 2500 | 70.37 | 540 | 69.02 | 58.15 | 5.38 | 6470 | 16.01 | 10.89 | 12.10 | 10.98 | 8.95 |
| 2840 Diesel | 1249 | Die. | 10500 | 1695 | 6 | 4.020x4.330 | 329 | 2500 | 80.65 | 1000 | 76.27 | 67.47 | 6.21 | 8386 | 16.02 | 11.52 | 12.36 | 11.57 | 9.59 |
| 2940 Diesel 16 Speed | 1351 | Die. | 10650 | 1215 | 6 | 4.19x4.33 | 359 | 2500 | 81.17 | 1000 | 81.46 | 67.98 | 4.64 | 7601 | 15.91 | 11.73 | 12.81 | 11.91 | 9.91 |
| 4040 Diesel | 1267 | Die. | 12055 | 1165 | 6 | 4.250x4.750 | 404 | 2200 | 90.80 | 1002 | 90.80 | 77.85 | 6.36 | 8936 | 13.49 | 10.59 | 11.24 | 10.96 | 9.21 |
| 4040 Syncro Range | 1359 | Die. | 12090 | 1600 | 6 | 4.25x4.75 | 404 | 2200 | 90.31 | 1002 | 90.31 | 77.04 | 8.14 | 9035 | 13.87 | 10.85 | 11.68 | 11.29 | 9.70 |
| 4040 Power Shift | 1360 | Die. | 12080 | 1590 | 6 | 4.25x4.75 | 404 | 2200 | 90.79 | 1000 | 90.88 | 78.54 | 4.45 | 9195 | 13.54 | 10.79 | 11.50 | 11.35 | 9.55 |
| 4240 Diesel | 1266 | Die. | 14090 | 1695 | 6 | 4.5625x4.75 | 466 | 2200 | 110.94 | 1002 | 110.94 | 95.18 | 5.42 | 11492 | 14.33 | 11.09 | 12.05 | 11.35 | 9.52 |
| 4240 Syncro Range | 1361 | Die. | 14240 | 2430 | 6 | 4.56x4.75 | 466 | 2200 | 2200 | 1002 | 110.81 | 95.40 | 4.90 | 12240 | 14.17 | 11.08 | 12.00 | 11.47 | 9.81 |
| 4240 Power Shift | 1362 | Die. | 14260 | 2440 | 6 | 4.56x4.75 | 466 | 2200 | 111.06 | 1000 | 111.43 | 95.65 | 4.51 | 12450 | 14.39 | 11.25 | 12.13 | 11.65 | 10.13 |
| 4440 Diesel | 1265 | Die. | 15540 | 2270 | 6 | 4.5625x4.75 | 466 | 2200 | 130.58 | 1002 | 130.58 | 112.56 | 5.02 | 13392 | 15.21 | 11.73 | 12.69 | 11.83 | 9.90 |
| 4440 Pwr Shift | 1357 | Die. | 15775 | 2656 | 6 | 4.56x4.75 | 466 | 2200 | 130.41 | 1010 | 130.41 | 114.16 | 4.53 | 13738 | 15.32 | 11.83 | 13.15 | 12.22 | 10.60 |
| 4640 Diesel | 1264 | Die. | 18120 | None | 6 | 4.5625x4.75 | 466 | 2200 | 156.30 | 998 | 156.30 | 134.70 | 6.45 | 15362 | 15.61 | 12.29 | 13.30 | 12.15 | 10.32 |
| 4640 Power Shift | 1358 | Die. | 18585 | 2805 | 6 | 4.56x4.75 | 466 | 2200 | 155.96 | 1000 | 157.01 | 137.04 | 4.81 | 15989 | 15.87 | 12.17 | 13.53 | 12.55 | 10.78 |
| 4840 Diesel | 1263 | Die. | 20370 | 2240 | 6 | 4.5625x4.75 | 466 | 2200 | 180.63 | 1000 | 181.63 | 157.09 | 4.76 | 17307 | 15.85 | 12.47 | 13.35 | 12.54 | 10.76 |
| 8430 Diesel | 1179 | Die. | 23100 | 290 | 6 | 4.563x4.750 | 466 | 2100 | 178.16 | 993 | 178.16 | 160.39 | 5.56 | 22503 | 15.12 | 11.98 | 13.44 | 12.64 | 10.72 |
| 8440 Diesel | 1323 | Die. | 26590 | None | 6 | 4.563x4.75 | 466 | 2100 | 179.83 | 993 | 179.83 | 163.26 | 4.97 | 25383 | 15.86 | 12.55 | 14.29 | 13.06 | 11.25 |
| 8450 Diesel | 1436 | Die. | (5) | (5) | 6 | 4.5625x4.75 | 466 | 2100 | 186.98 | 993 | 186.98 | 175.02 | 5.97 | 26567 | 15.69 | 12.91 | 14.45 | 13.53 | 11.63 |
| 8630 Diesel | 1180 | Die. | 26480 | 1950 | 6 | 5.125x5.000 | 619 | 2100 | 225.59 | 993 | 225.59 | 202.31 | 4.58 | 26443 | 15.34 | 12.27 | 13.67 | 12.80 | 10.78 |
| 8640 Diesel | 1324 | Die. | 28270 | None | 6 | 5.125x5.00 | 619 | 2100 | 228.75 | 993 | 228.75 | 208.38 | 4.63 | 27782 | 15.61 | 12.40 | 14.06 | 13.14 | 11.16 |
| 8650 Diesel | 1435 | Die. | (4) | (4) | 6 | 5.125x5.00 | 619 | 2100 | 238.56 | 993 | 238.56 | 221.80 | 5.55 | 28257 | 15.53 | 12.65 | 14.26 | 13.22 | 11.52 |
| 8850 Diesel | 1434 | Die. | (3) | (3) | 8 | 5.51x5.00 | 955 | 2100 | 303.99 | 996 | 303.99 | 274.91 | 6.59 | 35330 | 15.74 | 12.82 | 14.06 | 13.34 | 11.65 |

(1) With mechanical front wheel drive. (3) Tested without ballast, weight 37700. (4) Tested without ballast, weight 30270. (5) Tested without ballast, weight 29150.

**Duetz**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D4506 | 1131 | Die. | 7390 | 2880 | 3 | 3.940x4.720 | 172.5 | 2300 | 43.15 | 540 | 42.17 | 37.07 | 4.68 | 5472 | 18.01 | 14.12 | 14.49 | 14.05 | 12.46 |
| D6206 | 1219 | Die. | 8780 | 3410 | 4 | 3.937x4.724 | 230 | 2050 | 60.23 | 540 | 57.00 | 52.41 | 6.04 | 6944 | 17.58 | 15.43 | 15.10 | 15.34 | 14.05 |
| D6806 | 1220 | Die. | 11000 | 4605 | 4 | 3.937x4.724 | 230 | 2300 | 68.18 | 540 | 62.52 | 61.87 | 7.15 | 9095 | 16.55 | 14.73 | 14.63 | 15.05 | 13.52 |
| D13006 | 1130 | Die. | 16125 | 4075 | 6 | 3.940x4.720 | 345 | 2400 | 125.77 | 1000 | 126.19 | 110.24 | 5.74 | 13509 | 17.71 | 14.00 | 14.97 | 13.83 | 11.95 |
| DX-90 Diesel | 1305 | Die. | 13150 | 3210 | 5 | 3.94x4.72 | 287 | 2300 | 84.47 | 1000 | 80.82 | 74.19 | 6.53 | 8786 | 16.45 | 14.15 | 13.81 | 14.07 | 12.39 |
| DX-110 Diesel | 1306 | Die. | 14940 | 2360 | 6 | 3.94x4.72 | 345 | 2300 | 100.29 | 1000 | 93.61 | 90.82 | 7.00 | 11773 | 15.10 | 13.71 | 13.52 | 14.03 | 12.60 |

# Nebraska Tractor Tests Summarized (Tests from 1973 through 1982)

| | | | | | ENGINE | | | | | | | | | | —FUEL CONSUMPTION (HP Hours Per Gallon) @:— | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAKE AND MODEL OF TRACTOR | Test No. | Fuel Used | Weight With Ballast | Lbs. Ballast Carried | No. of Cylinders | Bore and Stroke | Displacement Cu. in. | Rated RPM Dwbr. | Max. PTO HP @ Rated Engine RPM | Std. PTO RPM | Max. PTO HP @ Std. PTO RPM | Max. Drawbar HP | MPH @ Max. Dwbr. HP | Max. Lbs. Pull | Max. PTO HP @ Std. PTO RPM | PTO Average @ Varying Power | —Varying Drawbar Power— Max. Available Power | 75% of Pull Max. Power | 50% of Pull @ Max. Power |
| **Deutz Cont.** | | | | | | | | | | | | | | | | | | | |
| DX-120 | 1405 | Die | 14950 | 1980 | 6 | 4.02x4.92 | 374 | 2400 | 111.29 | 1000 | 101.90 | 97.41 | 7.32 | 12615 | 16.40 | 13.84 | 13.59 | 13.48 | 12.03 |
| DX-130 | 1404 | Die. | 17630 | 3690 | 6 | 4.02x4.92 | 374 | 2300 | 121.27 | 1000 | 121.36 | 105.63 | 4.76 | 8330 | 17.63 | 13.77 | 14.14 | 13.10 | 11.26 |
| DX-160 Diesel | 1307 | Die. | 18710 | 3870 | 6 | 4.02x4.92 | 374 | 2200 | 145.41 | 1000 | 140.99 | 124.81 | 6.41 | 15172 | 17.82 | 14.47 | 14.56 | 13.95 | 11.93 |
| **Fiat** | | | | | | | | | | | | | | | | | | | |
| 420 | 1293 | Die. | 6035 | 2115 | 3 | 3.74x4.33 | 143 | 2200 | 41.34 | 540 | 37.45 | 37.71 | 5.65 | 5299 | 14.81 | 12.93 | 13.30 | 13.92 | 12.35 |
| 580 | 1292 | Die. | 9210 | 2580 | 3 | 4.055x4.33 | 168 | 2700 | 51.61 | 540 | 48.42 | 44.20 | 3.38 | 8899 | 14.93 | 12.59 | 12.14 | 12.70 | 10.50 |
| 780 | 1294 | Die. | 10230 | 2830 | 4 | 4.055x4.33 | 224 | 2500 | 70.36 | 540 | 66.30 | 64.43 | 4.06 | 7776 | 15.41 | 13.62 | 13.93 | 14.17 | 12.50 |
| **Ford** | | | | | | | | | | | | | | | | | | | |
| 1600 Diesel | 1228 | Die. | 3840 | 1150 | 2 | 3.543x3.937 | 77.6 | 2500 | 23.02 | 540 | 19.78 | 18.53 | 5.76 | 2634 | 14.14 | 11.82 | 11.26 | 11.45 | 9.72 |
| 1700 Diesel | 1325 | Die. | 3725 | 1110 | 2 | 3.54x3.94 | 77.6 | 2500 | 23.26 | 540 | 23.02 | 20.21 | 5.54 | 2801 | 13.02 | 11.21 | 10.89 | 11.48 | 10.41 |
| 1900 Diesel | 1326 | Die. | 4160 | 1225 | 3 | 3.35x3.31 | 87.2 | 2800 | 26.88 | 540 | 25.68 | 23.49 | 6.20 | 2964 | 12.58 | 10.38 | 10.41 | 10.89 | 9.32 |
| 2600 6-Speed | 1204 | Die. | 5990 | 1550 | 3 | 4.200x3.800 | 158 | 2000 | 32.38 | 540 | 30.51 | 27.93 | 5.57 | 4591 | 14.88 | 11.51 | 12.27 | 11.74 | 10.22 |
| 2600 6-Speed | 1206 | Gas. | 6000 | 1645 | 3 | 4.200x3.800 | 158 | 2000 | 32.78 | 540 | 31.03 | 28.25 | 5.57 | 4198 | 11.14 | 7.89 | 8.83 | 8.17 | 6.73 |
| 2600 8-Speed | 1222 | Die. | 6000 | 460 | 3 | 4.200x3.800 | 158 | 2000 | 32.47 | 540 | 30.76 | 28.18 | 5.56 | 4452 | 14.62 | 11.18 | 11.94 | 11.22 | 9.18 |
| 2600 8-Speed | 1207 | Gas. | 6000 | 1710 | 3 | 4.200x3.800 | 158 | 2000 | 34.18 | 540 | 32.07 | 30.20 | 5.49 | 4455 | 11.54 | 8.38 | 9.45 | 8.64 | 7.15 |
| 2610 (8x2) | 1421 | Die. | 5940 | 1780 | 3 | 4.2x4.2 | 175 | 2000 | 36.69 | 540 | 35.14 | 31.45 | 5.52 | 4473 | 16.15 | 12.82 | 13.03 | 12.71 | 10.51 |
| 3600 6-Speed | 1203 | Die. | 6860 | 2445 | 3 | 4.200x4.200 | 175 | 2000 | 40.49 | 540 | 37.64 | 34.47 | 5.96 | 5114 | 15.32 | 12.12 | 12.84 | 12.34 | 9.97 |
| 3600 6-Speed | 1208 | Gas. | 6900 | 2665 | 3 | 4.200x4.200 | 175 | 2000 | 40.17 | 540 | 37.91 | 35.53 | 5.91 | 5158 | 11.23 | 8.07 | 9.29 | 8.77 | 7.05 |
| 3600 8-Speed | 1221 | Die. | 6890 | 1300 | 3 | 4.200x4.200 | 175 | 2000 | 40.55 | 540 | 38.31 | 34.10 | 5.96 | 5277 | 15.33 | 12.40 | 12.93 | 12.51 | 10.36 |
| 3600 8-Speed | 1226 | Gas. | 6900 | 1500 | 3 | 4.200x4.200 | 175 | 2000 | 40.62 | 540 | 38.29 | 35.90 | 5.93 | 5123 | 11.42 | 8.16 | 9.02 | 8.57 | 6.88 |
| 3610 (8x2) | 1422 | Die. | 6340 | 2070 | 3 | 4.4x4.2 | 192 | 2000 | 42.26 | 540 | 40.17 | 36.80 | 5.85 | 4964 | 15.95 | 12.65 | 13.37 | 12.69 | 11.20 |
| 3610 (8x4) | 1423 | Die. | 6340 | 2045 | 3 | 4.4x4.2 | 192 | 2000 | 42.47 | 540 | 40.01 | 35.57 | 8.55 | 4917 | 16.26 | 12.94 | 12.85 | 12.44 | 10.53 |
| 4100 8-Speed | 1202 | Die. | 7500 | 2590 | 3 | 4.200x4.400 | 183 | 2000 | 45.46 | 540 | 41.13 | 41.14 | 4.63 | 5557 | 15.59 | 11.57 | 12.57 | 11.96 | 10.36 |
| 4110 (8x2) | 1424 | Die. | 7500 | 2850 | 3 | 4.4x4.4 | 201 | 2200 | 48.33 | 540 | 42.65 | 41.25 | 4.51 | 5681 | 15.77 | 12.64 | 13.26 | 12.34 | 10.76 |
| 4110 (8x4) | 1425 | Die. | 7500 | 2785 | 3 | 4.4x4.4 | 201 | 2200 | 49.26 | 540 | 44.06 | 40.59 | 4.92 | 5691 | 16.06 | 12.32 | 12.92 | 12.13 | 10.44 |
| 4600 8-Speed | 1223 | Die. | 8220 | 2340 | 3 | 4.400x4.400 | 201 | 2200 | 52.44 | 540 | 46.31 | 45.57 | 5.24 | 6342 | 14.59 | 11.49 | 11.82 | 11.85 | 10.77 |
| 4610 (8x2) | 1426 | Die. | 8190 | 3095 | 3 | 4.4x4.4 | 201 | 2200 | 52.52 | 540 | 46.72 | 44.51 | 5.17 | 6402 | 16.78 | 13.17 | 13.96 | 13.25 | 11.60 |
| 4610 (8x4) | 1427 | Die. | 8230 | 3085 | 3 | 4.4x4.4 | 201 | 2200 | 52.32 | 540 | 47.30 | 43.26 | 5.62 | 6534 | 16.83 | 13.05 | 13.53 | 12.77 | 11.18 |
| 5600 8-Speed | 1201 | Die. | 9690 | 3785 | 4 | 4.200x4.200 | 233 | 2100 | 60.46 | 540 | 56.85 | 52.22 | 5.49 | 7105 | 15.77 | 12.83 | 12.87 | 12.88 | 11.02 |
| 5600 16-Speed | 1227 | Die. | 9690 | 2380 | 4 | 4.200x4.200 | 233 | 2100 | 58.46 | 540 | 5600 | 49.79 | 5.36 | 7140 | 15.06 | 11.94 | 12.07 | 11.94 | 10.42 |
| 5610 (16x4) | 1428 | Die. | 9700 | 2325 | 4 | 4.4x4.2 | 256 | 2100 | 62.54 | 540 | 60.58 | 54.63 | 5.69 | 7408 | 15.57 | 12.38 | 12.82 | 12.44 | 10.30 |
| 5610 (16x8) | 1429 | Die. | 9545 | 3130 | 4 | 4.4x4.2 | 256 | 2100 | 62.57 | 540 | 59.99 | 53.70 | 6.57 | 7578 | 15.49 | 12.11 | 12.93 | 12.03 | 10.09 |
| 6600 8-Speed | 1217 | Die. | 9660 | 3780 | 4 | 4.400x4.200 | 256 | 2100 | 70.56 | 1000 | 70.07 | 61.36 | 6.91 | 7131 | 15.43 | 12.86 | 12.28 | 12.71 | 11.35 |
| 6600 16-Speed | 1224 | Die. | 9700 | 2680 | 4 | 4.400x4.200 | 256 | 2100 | 68.10 | 1000 | 68.05 | 58.74 | 5.22 | 7267 | 14.97 | 12.64 | 12.05 | 12.77 | 11.05 |
| 6610 (16x4) | 1430 | Die. | 9700 | 2270 | 4 | 4.4x4.4 | 268 | 2100 | 72.13 | 540 | 68.27 | 61.17 | 5.62 | 7887 | 15.64 | 13.14 | 13.40 | 12.90 | 10.77 |
| 6610 (16x8)(2) | 1431 | Die. | 9700 | 2725 | 4 | 4.4x4.4 | 268 | 2100 | 72.30 | 540 | 69.20 | 62.64 | 6.49 | 7948 | 15.43 | 12.91 | 13.18 | 12.84 | 10.87 |
| 6700 16-Speed | 1244 | Die. | 9690 | 1180 | 4 | 4.400x4.200 | 255 | 2100 | 68.94 | 1000 | 68.62 | 58.06 | 7.55 | 6787 | 13.77 | 12.23 | 11.24 | 12.38 | 11.16 |
| 7600 16-Speed | 1225 | Die. | 10760 | 3320 | 4 | 4.400x4.200 | 256 | 2100 | 84.79 | 1000 | 85.16 | 67.95 | 5.61 | 7779 | 15.95 | 12.35 | 12.44 | 11.77 | 9.92 |
| 7610 (16x4) | 1432 | Die. | 10800 | 2220 | 4 | 4.4x4.4 | 268 | 2100 | 86.95 | 1000 | 86.79 | 74.22 | 5.53 | 8804 | 15.75 | 12.44 | 13.36 | 12.29 | 10.35 |
| 7710 (16x8) (2) | 1433 | Die. | 10800 | 2025 | 4 | 4.4x4.4 | 268 | 2100 | 86.62 | 1000 | 86.55 | 74.84 | 6.89 | 9615 | 15.87 | 12.60 | 13.84 | .... | .... |
| 7700 16-Speed | 1242 | Die. | 10800 | 2400 | 4 | 4.400x4.200 | 255 | 2100 | 84.38 | 1000 | 84.29 | 71.57 | 7.28 | 7688 | 15.24 | 11.65 | 11.92 | 11.21 | 9.71 |
| 8700 16-Speed | 1245 | Die. | 14760 | 2490 | 6 | 4.400x4.400 | 401 | 2300 | 110.58 | 1000 | 99.56 | 100.12 | 6.94 | 11581 | 15.02 | 11.91 | 12.37 | 12.28 | 10.93 |
| 8600 Dual Power | 1121 | Die. | 14790 | 3360 | 6 | 4.400x4.400 | 401 | 2300 | 110.69 | 1000 | 99.32 | 93.26 | 4.88 | 11363 | 15.69 | 12.84 | 12.71 | 12.74 | 11.19 |
| 9600 Dual Power | 1122 | Die. | 18000 | 6140 | 6 | 4.400x4.400 | 401 | 2200 | 135.46 | 1000 | 128.46 | 116.40 | 6.65 | 12203 | 16.88 | 12.99 | 13.31 | 12.64 | 11.06 |
| 9700 16-Speed | 1243 | Die. | 17480 | 4620 | 6 | 4.40x4.400 | 401 | 2200 | 135.64 | 1000 | 129.25 | 118.08 | 6.55 | 15010 | 15.95 | 11.77 | 12.63 | 11.97 | 10.34 |
| TW-10 Diesel | 1301 | Die. | 15190 | 2325 | 6 | 4.4x4.4 | 401 | 2300 | 110.24 | 1000 | 101.09 | 97.35 | 5.23 | 12006 | 14.86 | 11.50 | 12.17 | 11.91 | 10.20 |
| TW-20 Diesel | 1300 | Die. | 17180 | 3945 | 6 | 4.4x4.4 | 401 | 2200 | 135.60 | 1000 | 131.43 | 121.47 | 7.85 | 14155 | 16.22 | 11.78 | 13.08 | 12.04 | 10.09 |
| TW-30 Diesel | 1299 | Die. | 19830 | 5205 | 6 | 4.4x4.4 | 401 | 2200 | 163.28 | 1000 | 157.04 | 144.17 | 8.32 | 16553 | 16.76 | 12.49 | 13.67 | 12.58 | 10.79 |
| FW-20 | 1291 | Die. | 31000 | 1385 | 8 | 4.625x4.125 | 555 | 2850 | .... | .... | .... | 156.85 | 5.45 | 27155 | .... | .... | 12.12 | 11.69 | 10.15 |
| FW30 | 1288 | Die. | 31720 | 410 | 8 | 5.500x4.750 | 903 | 2600 | (1) | .... | .... | 212.02 | 6.64 | 27803 | .... | .... | 13.71 | 12.24 | 10.08 |
| FW 30 without PTO | | | | | | | | | | | | 220.38 | 5.85 | 28302 | .... | .... | 14.16 | 12.73 | 10.96 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FW40 | 1290 | Die. | 32950 | 2320 | 8 | 5.500x4.750 | 903 | 2600 | .... | .... | .... | 238.78 | 6.60 | 28245 | .... | .... | 13.83 | 12.84 | 10.73 |
| FW 60 | 1289 | Die. | 33970 | 2870 | 8 | 5.500x4.750 | 903 | 2600 | .... | .... | .... | 285.57 | 7.45 | 29304 | .... | .... | 14.90 | 13.38 | 11.27 |

(1) Equipped with controlled, hydrostatic pto with 105 output horsepower at 1000 rpm. (2) Drawbar information is from test run with radial ply tires.

**Hesston Fiat**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 480-8 DT and 480-8 12 & 8 Speed | 1385 | Die. | 7805 | 2485 | 3 | 3.937x4.33 | 158 | 2600 | 42.58 | 540 | 40.36 | 37.07 | 5.07 | 5265 | 16.93 | 12.27 | 13.34 | 12.54 | 10.64 |
| 680DT & 680 8 Speed | 1352 | Die. | 10000 | 2660 | 4 | 3.937x4.331 | 211 | 2500 | 62.47 | 1000 | 61.20 | 53.65 | 5.44 | 6252 | 17.40 | 14.19 | 14.80 | 14.20 | 12.45 |
| 780 DT and 780 8-Speed | 1386 | Die. | 10100 | 3920 | 4 | 4.055x4.33 | 224 | 2500 | 70.57 | 540 | 66.67 | 62.06 | 7.61 | 6965 | 16.71 | 13.96 | 13.72 | 13.86 | 12.26 |
| 880DT-5 & 880-5 12 Speed | 1353 | Die. | 11560 | 2810 | 5 | 4.055x4.331 | 280 | 2500 | 81.32 | 1000 | 80.95 | 70.73 | 7.63 | 7554 | 16.27 | 13.23 | 13.50 | 13.44 | 11.65 |
| 980DT & 980 16 Speed | 1354 | Die. | 12645 | 3795 | 6 | 3.937x4.33 | 316 | 2400 | 91.12 | 996 | 91.12 | 77.42 | 5.00 | 8351 | 16.90 | 13.92 | 14.25 | 13.59 | 12.25 |
| 1180 DT Turbo | 1450 | Die. | 16885 | 1935 | 6 | 4.055x4.33 | 335 | 2550 | 107.48 | 1000 | 104.22 | 93.71 | 4.37 | 12905 | 16.40 | 12.54 | 14.16 | 12.74 | 10.42 |
| 1380DT, 1380 | 1409 | Die. | 16995 | 1795 | 6 | 4.055x4.33 | 335 | 2400 | 123.16 | 1000 | 123.54 | 104.97 | 8.08 | 13105 | 16.49 | 13.30 | 13.60 | 13.01 | 11.62 |
| 1580DT Turbo | 1451 | Die. | 19060 | 2460 | 6 | 4.528x5.118 | 494 | 2200 | 141.44 | 1000 | 136.14 | 124.15 | 5.48 | 15342 | 17.28 | 13.49 | 14.70 | 13.53 | 11.47 |
| 1880DT, 1880 | 1410 | Die. | 19710 | 3020 | 6 | 4.528x5.118 | 494 | 2200 | 162.48 | 1000 | 159.83 | 138.81 | 5.44 | 15656 | 16.88 | 13.87 | 14.53 | 13.58 | 12.07 |

**International Harvester**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hydro 70 Gas | 1154 | Gas | 10140 | 2265 | 6 | 3.750x4.390 | 290.8 | 2400 | 69.61 | 540 | 64.10 | 55.09 | 7.00 | 8427 | 11.10 | 7.17 | 7.65 | 6.75 | 5.48 |
| Hydro 70 Die | 1155 | Die. | 10430 | 1990 | 6 | 3.875x4.410 | 312 | 2400 | 69.51 | 540 | 65.41 | 54.11 | 7.00 | 8310 | 12.40 | 9.31 | 9.45 | 8.76 | 6.97 |
| Hydro 84 Diesel | 1316 | Die. | 9120 | 3115 | 4 | 3.937x5.062 | 246 | 2400 | 58.73 | 540 | 56.68 | 43.59 | 7.60 | 6572 | 14.01 | 10.50 | 10.13 | 9.82 | 8.34 |
| Hydro 86 Diesel | 1337 | Die. | 10710 | 2545 | 6 | 3.875x4.375 | 310 | 2400 | 70.89 | 540 | 66.64 | 54.10 | 4.03 | 8815 | 14.18 | 10.23 | 9.92 | 9.55 | 8.24 |
| Hydro 100 | 1158 | Die. | 12765 | 635 | 6 | 4.300x5.000 | 436 | 2400 | 104.17 | 1000 | 101.30 | 82.13 | 6.42 | 9801 | 14.83 | 10.50 | 10.35 | 10.19 | 8.95 |
| Hydro 186 Diesel | 1257 | Die. | 13430 | None | 6 | 4.300x5.000 | 436 | 2400 | 105.02 | 1000 | 100.31 | 82.77 | 6.56 | 11312 | 13.68 | 10.06 | 9.83 | 9.84 | 8.46 |
| 284 | 1277 | Gas. | 3596 | 1166 | 4 | 2.756x2.992 | 71.3 | 2600 | 25.75 | 1000 | 24.33 | 20.64 | 4.02 | 2561 | 11.62 | 9.54 | 9.77 | 8.97 | 7.52 |
| 284 8 Speed | 1387 | Die. | 3600 | 860 | 3 | 3.27x3.94 | 99 | 2600 | 27.47 | 540 | 23.92 | 23.52 | 5.71 | 2523 | 14.40 | 10.91 | 10.99 | 10.53 | 9.18 |
| 464 Gas | 1126 | Gas. | 7355 | 2460 | 4 | 3.562x4.390 | 175 | 2400 | 45.74 | 540 | 43.64 | 42.20 | 4.51 | 5465 | 10.80 | 8.00 | 9.65 | 8.86 | 7.70 |
| 464 Diesel | 1127 | Die. | 7570 | 2440 | 3 | 3.875x5.060 | 179 | 2400 | 44.42 | 540 | 41.73 | 39.97 | 4.53 | 5488 | 14.41 | 11.49 | 12.25 | 12.57 | 10.67 |
| 484 Utility Dsl. | 1312 | Die. | 7710 | 2710 | 3 | 3.875x5.06 | 179 | 2200 | 42.42 | 540 | 41.79 | 38.06 | 4.78 | 5500 | 14.81 | 11.85 | 12.75 | 12.39 | 10.63 |
| 584 Utility & Rowcrop | 1313 | Die. | 8850 | 3185 | 4 | 3.875x4.38 | 206 | 2300 | 52.54 | 540 | 50.96 | 47.47 | 5.07 | 6859 | 15.23 | 12.34 | 13.41 | 12.95 | 11.10 |
| 666 Gas | 1152 | Gas. | 10050 | 2360 | 6 | 3.750x4.390 | 290.8 | 2000 | 66.30 | 543 | 66.30 | 59.31 | 7.39 | 7981 | 11.95 | 8.45 | 10.08 | 9.04 | 7.27 |
| 666 Diesel | 1151 | Die. | 10330 | 2130 | 6 | 3.875x4.410 | 312 | 2000 | 66.29 | 543 | 66.29 | 58.34 | 5.12 | 8012 | 14.24 | 11.60 | 12.60 | 11.98 | 10.16 |
| 674 Utility Gas | 1128 | Gas. | 8330 | 3035 | 4 | 3.812x4.390 | 200 | 2400 | 58.53 | 540 | 56.01 | 53.48 | 7.04 | 6583 | 10.83 | 8.19 | 9.40 | 9.11 | 8.39 |
| 674 Utility Die. | 1129 | Die. | 8690 | 3040 | 4 | 3.875x5.060 | 238.6 | 2400 | 61.56 | 540 | 58.79 | 55.91 | 7.03 | 6833 | 15.25 | 12.16 | 13.52 | 13.11 | 11.31 |
| 684 Utility & Rowcrop | 1314 | Die. | 9660 | 3825 | 4 | 3.875x5.06 | 239 | 2400 | 62.52 | 540 | 58.75 | 55.92 | 5.29 | 6858 | 15.55 | 12.21 | 13.27 | 13.02 | 11.28 |
| 686 Diesel (same as 666 Diesel) | | | | | | | | | | | | | | | | | | | |
| 686 Diesel 10 Speed | 1336 | Die. | 10340 | 2360 | 6 | 3.875x4.375 | 310 | 2000 | 66.36 | 543 | 66.36 | 58.81 | 5.08 | 8043 | 16.07 | 13.16 | 13.93 | 13.27 | 11.53 |
| 784 Rowcrop Diesel | 1315 | Die. | 9920 | 3830 | 4 | 3.937x5.062 | 246 | 2400 | 67.48 | 1000 | 64.09 | 58.65 | 5.18 | 8105 | 16.06 | 12.75 | 13.25 | 12.77 | 11.07 |
| 786 16 Speed | 1388 | Die. | 11930 | 340 | 6 | 3.875x5.0625 | 358 | 2400 | 80.20 | 1000 | 77.41 | 70.25 | 4.74 | 9968 | 15.72 | 11.40 | 12.72 | 11.88 | 10.00 |
| 884 Rowcrop | 1376 | Die. | 10150 | 3945 | 4 | 3.937x5.51 | 268 | 2400 | 72.91 | 1000 | 69.76 | 65.39 | 5.54 | 8116 | 15.76 | 12.47 | 13.48 | 12.91 | 11.05 |
| 886 Diesel | 1254 | Die. | 13040 | 970 | 6 | 3.875x5.085 | 360 | 2400 | 86.14 | 1000 | 83.16 | 76.16 | 4.70 | 10485 | 14.29 | 10.55 | 11.77 | 10.92 | 9.21 |
| 886 Diesel 16 Speed | 1338 | Die. | 13450 | 1710 | 6 | 3.875x5.063 | 358 | 2400 | 86.57 | 1000 | 83.91 | 76.25 | 4.69 | 10807 | 16.01 | 11.77 | 12.97 | 12.21 | 10.62 |
| 886 Dsl. 16 Speed (1) | 1339 | Die. | 13450 | 1710 | 6 | 3.875x5.063 | 358 | 2400 | 90.56 | 1000 | 88.23 | 80.13 | 4.69 | 10930 | 15.84 | 11.98 | 12.81 | 12.38 | 10.86 |

(1) Serial No. 2490208 U17026 and up.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 966 Diesel | 1123 | Die. | 13670 | 1970 | 6 | 4.300x4.750 | 414 | 2600 | 100.80 | 1000 | 101.52 | 88.94 | 6.58 | 10036 | 15.68. | 10.94 | 12.36 | 11.68 | 9.84 |
| 986 Diesel | 1255 | Die. | 14000 | 970 | 6 | 4.300x5.000 | 436 | 2400 | 105.68 | 1000 | 104.18 | 94.60 | 4.98 | 12176 | 15.56 | 11.34 | 12.65 | 11.72 | 10.02 |
| 1066 Turbo Diesel | 1124 | Die. | 15260 | 1945 | 6 | 4.300x4.750 | 414 | 2600 | 125.68 | 1000 | 119.20 | 108.87 | 7.03 | 13000 | 16.37 | 11.32 | 12.78 | 11.97 | 9.99 |
| 1086 w/Radial Tires | 1247 | Die. | 15640 | 2915 | 6 | 4.300x4.375 | 414 | 2400 | 131.41 | 1000 | 133.67 | 116.28 | 4.40 | 13503 | 16.39 | 11.90 | 13.28 | 12.36 | 10.45 |
| 1086 w/Bias Ply Tires | 1247 | Die. | 15640 | 3100 | 6 | 4.300x4.375 | 414 | 2400 | 131.41 | 1000 | 133.67 | 114.14 | 6.66 | 12137 | 16.39 | 11.90 | 12.83 | 12.08 | 10.52 |
| 1466 Turbo Diesel | 1125 | Die. | 16660 | 2990 | 6 | 4.300x5.000 | 436 | 2600 | 145.77 | 1000 | 145.84 | 127.02 | 6.93 | 13673 | 17.03 | 11.83 | 13.03 | 12.01 | 10.35 |
| Farmall 1468 | 1118 | Die. | 16310 | 2850 | 8 | 4.500x4.313 | 550 | 2600 | 145.49 | 1000 | 136.85 | 129.31 | 7.33 | 12932 | 15.93 | 12.40 | 13.87 | 13.22 | 11.17 |
| 1566 Turbo Dsl | 1174 | Die. | 18260 | 3065 | 6 | 4.300x5.000 | 436 | 2600 | 161.01 | 1000 | 162.31 | 140.35 | 5.64 | 15774 | 16.16 | 11.51 | 12.55 | 11.69 | 9.86 |
| 1568 Diesel | 1175 | Die. | 17350 | 2400 | 8 | 4.500x4.313 | 550 | 2600 | 150.70 | 1000 | 147.79 | 133.79 | 5.69 | 14918 | 14.99 | 12.08 | 13.00 | 12.59 | 10.80 |
| 1586 w/Radial Tires | 1248 | Die. | 17600 | 2480 | 6 | 4.300x5.000 | 436 | 2500 | 161.55 | 1000 | 156.09 | 140.65 | 5.55 | 16665 | 16.51 | 12.28 | 13.02 | 12.38 | 10.51 |
| 1586 w/Bias Ply Tires | 1248 | Die. | 17600 | 3010 | 6 | 4.300x5.000 | 436 | 2500 | 161.55 | 1000 | 156.09 | 140.08 | 6.05 | 15124 | 16.51 | 12.28 | 12.74 | 12.38 | 10.54 |
| 3288 Diesel | 1438 | Die. | 13560 | 1800 | 6 | 3.875x5.062 | 358 | 2400 | 90.46 | 1000 | 88.33 | 80.72 | 6.11 | 11486 | 15.94 | 11.69 | 13.16 | 12.31 | 10.27 |
| 3388 Diesel | 1319 | Die. | 17850 | 430 | 6 | 4.300x5.000 | 436 | 2400 | 130.61 | 1000 | 128.59 | 114.42 | 6.67 | 16764 | 16.85 | 12.00 | 13.52 | 12.17 | 10.09 |
| 3488 Hydro | 1439 | Die. | 13940 | 1060 | 6 | 4.30x5.35 | 466 | 2400 | 112.56 | 1000 | 107.11 | 83.43 | 6.50 | 7130 | 15.28 | 10.64 | 10.00 | 9.73 | 8.43 |
| 3588 Diesel | 1320 | Die. | 18890 | 1270 | 6 | 4.300x5.350 | 466 | 2400 | 150.41 | 1000 | 152.07 | 130.94 | 6.65 | 17589 | 16.98 | 12.19 | 13.13 | 12.20 | 10.30 |
| 3688 Diesel | 1440 | Die. | 14335 | 1135 | 6 | 4.30x5.00 | 436 | 2400 | 113.72 | 1000 | 112.48 | 100.12 | 5.46 | 12250 | 15.75 | 11.82 | 13.30 | 12.35 | 10.38 |
| 3788 12 Speed | 1377 | Die | 20820 | 2200 | 6 | 4.300x5.350 | 466 | 2500 | 170.57 | 1000 | 166.39 | 146.43 | 7.49 | 19069 | 17.12 | 12.22 | 13.24 | 12.25 | 10.06 |
| 4366 Turbo D | 1153 | Die. | 23000 | 1310 | 6 | 4.300x5.350 | 466 | 2600 | .... | .... | .... | 168.90 | 6.65 | 23138 | .... | .... | 12.54 | 11.98 | 10.34 |
| 4386 Diesel | 1256 | Die. | 24930 | None | 6 | 4.300x5.350 | 466 | 2600 | .... | .... | .... | 176.02 | 8.71 | 23321 | .... | .... | 12.43 | 11.92 | 10.18 |

# Nebraska Tractor Tests Summarized (Tests from 1973 through 1982)

| | | | | | | ENGINE | | | | | | | | | —FUEL CONSUMPTION (HP Hours Per Gallon) @:— | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | —Varying Drawbar Power— | | |
| MAKE AND MODEL OF TRACTOR | Test No. | Fuel Used | Weight With Ballast | Lbs. Ballast Carried | No. of Cylinders | Bore and Stroke | Displacement Cu. in. | Rated RPM Dwbr. | Max. PTO HP @ Rated Engine RPM | Std. PTO RPM | Max. PTO HP @ Std. PTO RPM | Max. Drawbar HP | MPH @ Max. Dwbr. HP | Max. Lbs. Pull | Max. PTO HP @ Std. PTO RPM | PTO Average @ Varying Power | Max. Available Power | 75% of Pull Max. Power | 50% of Pull @ Max. Power |
| **International Harvester Cont.** | | | | | | | | | | | | | | | | | | | |
| 4568 | 1216 | Die. | 29870 | 4120 | 8 | 5.3125x4.50 | 798 | 2600 | .... | .... | .... | 235.72 | 6.76 | 27995 | .... | .... | 12.89 | 11.79 | 9.73 |
| 4786 Diesel | 1317 | Die. | 34350 | 4150 | 8 | 5.313x4.500 | 798 | 2600 | .... | .... | .... | 265.55 | 4.79 | 33468 | .... | .... | 12.80 | 11.92 | 9.86 |
| 5088 Diesel (2) | 1419 | Die. | 16250 | 240 | 6 | 4.30x5.00 | 436 | 2400 | 136.12 | 1005 | 136.12 | 121.17 | 5.06 | 14357 | 15.32 | 11.65 | 13.23 | 12.04 | 9.90 |
| 5288 Diesel | 1420 | Die. | 18585 | 1530 | 6 | 4.30x5.35 | 466 | 2400 | 162.60 | 1005 | 162.60 | 142.37 | 5.27 | 17577 | 16.07 | 12.62 | 13.70 | 12.77 | 10.75 |
| 5488 Diesel | 1441 | Die. | 20005 | 2765 | 6 | 4.30x5.35 | 456 | 2400 | 187.22 | 1005 | 187.22 | 164.82 | 5.27 | 18646 | 16.20 | 13.00 | 14.16 | 13.15 | 11.21 |
| (2) Drawbar information is from test run with radial ply tires. | | | | | | | | | | | | | | | | | | | |
| **Kubota** | | | | | | | | | | | | | | | | | | | |
| L185 | 1285 | Die. | 3370 | 1430 | 2 | 3.000x3.23 | 45.3 | 2800 | 15.33 | 540 | 14.07 | 13.03 | 5.57 | 1939 | 13.60 | 10.90 | 10.38 | 10.82 | 9.26 |
| L185DT | 1286 | Die. | 3415 | 1283 | 2 | 3.000x3.23 | 45.3 | 2800 | 15.45 | 540 | 14.16 | 12.65 | 3.94 | 2322 | 13.49 | 11.00 | 10.34 | 10.24 | 8.70 |
| L225 Diesel | 1145 | Die. | 3452 | 1457 | 3 | 3.000x3.23 | 68 | 2700 | 20.86 | 1000† | 19.96 | 17.69 | 6.34 | 2015 | 14.25 | 11.12 | 10.71 | 10.78 | 9.36 |
| L235 | 1406 | Die. | 3715 | 1280 | 3 | 3.0x3.23 | 68 | 2600 | 19.59 | 540 | 19.63 | 16.05 | 4.68 | 2440 | 14.33 | 11.34 | 11.33 | 10.85 | 9.23 |
| L245 | 1283 | Die. | 3694 | 1498 | 3 | 3.000x3.23 | 68 | 2800 | 22.06 | 540 | 20.11 | 18.66 | 5.74 | 2067 | 13.98 | 11.07 | 10.74 | 10.70 | 9.16 |
| L245DT | 1284 | Die. | 3792 | 1410 | 3 | 3.000x3.23 | 68 | 2800 | 22.35 | 540 | 20.15 | 18.48 | 6.06 | 2419 | 14.33 | 11.21 | 10.88 | 10.67 | 9.22 |
| L275 | 1407 | Die. | 4055 | 1430 | 3 | 3.23x3.23 | 79.3 | 2600 | 23.42 | 540 | 23.01 | 19.70 | 4.84 | 2717 | 14.57 | 11.55 | 11.62 | 11.07 | 9.95 |
| L285 Diesel | 1198 | Die. | 4030 | 1585 | 4 | 2.992x3.228 | 91 | 2400 | 26.45 | 540 | 23.58 | 22.94 | 6.62 | 3134 | 14.63 | 12.16 | 11.78 | 12.16 | 10.65 |
| L295DT and L295 8 Speed | 1370 | Die. | 4700 | 1805 | 3 | 3.23 x3.23 | 79.3 | 2800 | 26.46 | 540 | 24.91 | 22.82 | 4.34 | 3155 | 14.59 | 11.75 | 11.57 | 11.39 | 9.58 |
| L305DT and L305 8 Speed | 1371 | Die. | 5360 | 2070 | 3 | 3.23 x3.23 | 79.3 | 2800 | 26.21 | 540 | 25.14 | 22.96 | 4.16 | 3918 | 13.83 | 11.14 | 11.15 | 11.13 | 9.46 |
| L345DT and L345 8 Speed | 1372 | Die. | 5435 | 2000 | 4 | 3.00 x3.23 | 90.7 | 2800 | 29.35 | 540 | 28.80 | 26.72 | 4.62 | 3795 | 12.76 | 10.58 | 10.68 | 10.81 | 9.15 |
| M4500DT & M4500 16 Speed | 1348 | Die. | 7800 | 2635 | 6 | 3.23 x3.23 | 158.5 | 2600 | 49.72 | 540 | 44.49 | 42.50 | 6.16 | 4812 | 15.19 | 12.22 | 11.90 | 12.02 | 10.77 |
| M5500DT and M5500 16 Speed | 1369 | Die. | 8710 | 3210 | 3 | 4.134x4.528 | 182 | 2400 | 53.99 | 540 | 49.18 | 46.96 | 5.51 | 6287 | 16.22 | 12.44 | 13.05 | 12.77 | 11.05 |
| M7500DT & M7500 16 Speed | 1349 | Die. | 9510 | 3530 | 4 | 4.134x4.528 | 243 | 2400 | 72.34 | 540 | 66.54 | 61.29 | 6.65 | 6327 | 17.83 | 14.15 | 13.93 | 14.20 | 12.40 |
| **Lamborghini** | | | | | | | | | | | | | | | | | | | |
| 1056DT | 1269 | Die. | 12050 | 1700 | 6 | 3.86x4.72 | 331 | 2220 | 92.13 | 1000 | 89.98 | 79.51 | 6.86 | 9135 | 15.16 | 13.02 | 12.45 | 12.74 | 10.93 |
| **Leyland** | | | | | | | | | | | | | | | | | | | |
| 245 Diesel | 1177 | Die. | 7850 | 1970 | 3 | 3.600x5.000 | 152.7 | 2250 | 39.73 | 540 | 36.38 | 35.09 | 4.47 | 5056 | 16.30 | 12.60 | 13.02 | 12.67 | 11.29 |
| 255 Diesel | 1176 | Die. | 8610 | 2310 | 4 | 3.858x4.921 | 230 | 2200 | 47.91 | 540 | 43.85 | 43.00 | 6.58 | 5891 | 16.42 | 11.10 | 12.78 | 11.81 | 9.50 |
| 472 & 272 Die.9-Speed | 1341 | Die. | 11990 | 4580 | 4 | 3.858x4.921 | 230 | 2200 | 63.52 | 540 | 58.50 | 53.27 | 5.91 | 7224 | 14.97 | 12.28 | 11.32 | 11.67 | 10.48 |
| 482 & 282 Die 9 Speed | 1340 | Die. | 12000 | 4590 | 4 | 3.858x4.921 | 230 | 2200 | 74.28 | 540 | 70.86 | 61.19 | 5.86 | 7032 | 17.58 | 12.63 | 12.70 | 12.10 | 10.09 |
| 2100 Diesel | 1178 | Die. | 13260 | 4350 | 6 | 3.860x4.920 | 344.7 | 2100 | 88.40 | 1000 | 83.30 | 75.70 | 4.95 | 8617 | 16.29 | 13.20 | 13.16 | 13.24 | 11.24 |
| **Long** | | | | | | | | | | | | | | | | | | | |
| 360 Diesel | 1298 | Die. | 6410 | 1930 | 3 | 3.74x4.33 | 143 | 2400 | 36.16 | 540 | 31.06 | 31.91 | 5.20 | 4808 | 14.41 | 11.97 | 12.45 | 12.13 | 10.48 |
| 510 Diesel | 1415 | Die. | 8210 | 392.5 | 3 | 4.02x4.33 | 164.5 | 2400 | 49.15 | 540 | 46.91 | 43.27 | 5.14 | 6040 | 15.74 | 13.48 | 13.15 | 13.52 | 12.24 |
| 510DTC Diesel | 1416 | Die. | 9100 | 3835 | 3 | 4.02x4.33 | 164.5 | 2400 | 49.35 | 540 | 46.41 | 41.87 | 4.63 | 5635 | 16.04 | 13.72 | 13.68 | 13.30 | 11.69 |
| 610 Diesel | 1417 | Die. | 8985 | 4290 | 4 | 4.02x4.33 | 219 | 2400 | 64.33 | 540 | 60.57 | 57.48 | 2.13 | 7018 | 15.93 | 15.02 | 13.58 | 13.51 | 11.92 |
| 900 Diesel and 910 Diesel | 1163 | Die. | 12575 | 4375 | 4 | 4.33x4.72 | 278 | 2200 | 72.88 | 1000 | 72.86 | 62.50 | 6.53 | 7843 | 13.06 | 12.15 | 10.97 | 13.00 | 11.38 |
| **Massey-Ferguson** | | | | | | | | | | | | | | | | | | | |
| MF154-4 | 1411 | Die. | 6920 | 1615 | 3 | 3.6x5.0 | 153 | 2250 | 42.52 | 540 | 40.38 | 35.40 | 4.52 | 4144 | 17.26 | 13.41 | 13.79 | 13.00 | 11.42 |
| MF184-4 12 Speed | 1392 | Die. | 7775 | 1395 | 4 | 3.875x5.0 | 236 | 2200 | 62.45 | 540 | 59.56 | 52.38 | 7.13 | 5500 | 16.41 | 12.37 | 12.61 | 12.11 | 10.69 |
| MF205 6 Speed | 1363 | Die. | 2840 | 935 | 2 | 3.46x3.46 | 65.2 | 2400 | 16.56 | 540 | 16.34 | 13.45 | 4.39 | 1995 | 12.97 | 9.62 | 9.98 | 9.65 | 8.03 |
| MF205-4 6 Speed | 1364 | Die. | 3120 | 905 | 2 | 3.46x3.46 | 65.2 | 2400 | 16.40 | 540 | 16.18 | 13.57 | 4.86 | 2131 | 12.83 | 9.69 | 10.04 | 9.57 | 8.02 |
| MF210 12 Speed | 1365 | Die. | 3550 | 1090 | 2 | 3.62x3.74 | 77.1 | 2500 | 21.96 | 540 | 21.23 | 18.08 | 5.81 | 2159 | 13.61 | 11.04 | 10.84 | 10.53 | 9.36 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MF210-4 12 Speed.........1366 | Die. | 3765 | 1030 | 2 | 3.62x3.74 | 77.1 | 2500 | 21.77 | 540 | 21.02 | 17.60 | 6.91 | 2158 | 13.18 | 10.75 | 9.97 | 10.44 | 8.61 |
| MF220 12 Speed............1367 | Die. | 4220 | 1455 | 2 | 3.82x3.94 | 90.3 | 2500 | 26.37 | 540 | 25.52 | 23.95 | 4.34 | 3287 | 13.36 | 11.07 | 11.22 | 11.60 | 10.17 |
| MF220-4 12 Speed.........1368 | Die. | 4487 | 1307 | 2 | 3.82x3.94 | 90.3 | 2500 | 26.48 | 540 | 26.06 | 22.91 | 3.84 | 3496 | 14.09 | 11.56 | 11.09 | 11.55 | 10.02 |
| MF230 Gasoline.............1215 | Gas. | 4870 | 1030 | 4 | 3.375x4.062 | 145 | 2000 | 34.34 | 540 | 31.29 | 29.58 | 5.08 | 3717 | 11.85 | 8.72 | 9.89 | 8.90 | 7.85 |
| MF230 Diesel.................1214 | Die. | 5110 | 1110 | 3 | 3.600x5.000 | 153 | 2000 | 34.53 | 540 | 30.80 | 29.66 | 7.64 | 4030 | 18.18 | 14.81 | 15.06 | 14.74 | 12.87 |
| MF235 Gasoline.............1194 | Gas. | 5785 | 1655 | 4 | 3.375x4.062 | 145 | 2250 | 41.13 | 540 | 33.87 | 35.29 | 5.86 | 4294 | 10.49 | 7.99 | 8.69 | 8.07 | 6.69 |
| MF235 Diesel.................1187 | Die. | 5860 | 1725 | 3 | 3.600x5.000 | 153 | 2250 | 42.39 | 540 | 35.29 | 36.29 | 5.84 | 4281 | 16.78 | 13.52 | 13.80 | 13.39 | 11.56 |
| 245 Diesel .......................1251 | Die. | 6150 | 2100 | 3 | 3.600x5.000 | 153 | 2250 | 42.90 | 540 | 36.50 | 36.75 | 5.92 | 4279 | 16.25 | 12.72 | 12.43 | 12.79 | 11.13 |
| 245 Gasoline ....................1252 | Gas. | 6020 | 2120 | 4 | 3.375x4.062 | 145 | 2250 | 41.09 | 540 | 34.15 | 35.50 | 5.90 | 4298 | 11.74 | 9.07 | 9.50 | 9.07 | 7.88 |
| MF255 Gasoline.............1190 | Gas. | 7280 | 1140 | 4 | 3.875x4.500 | 212 | 2000 | 50.01 | 540 | 47.14 | 43.49 | 5.28 | 5668 | 10.91 | 8.00 | 8.94 | 8.54 | 6.72 |
| MF255 Diesel.................1189 | Die. | 7130 | 1160 | 4 | 3.600x5.000 | 203 | 2000 | 50.69 | 540 | 45.55 | 43.72 | 5.28 | 5257 | 15.88 | 13.32 | 13.44 | 13.36 | 12.24 |
| 255 12-Speed ..................1250 | Die. | 7310 | 895 | 4 | 3.875x5.000 | 236 | 2000 | 52.68 | 540 | 48.37 | 44.75 | 7.89 | 5591 | 16.92 | 12.70 | 13.34 | 12.82 | 11.03 |
| MF265 Diesel.................1188 | Die. | 8200 | 1815 | 4 | 3.875x5.000 | 236 | 2000 | 60.73 | 540 | 54.76 | 51.87 | 5.23 | 6248 | 15.88 | 13.44 | 13.52 | 13.51 | 12.16 |
| MF275 Diesel.................1193 | Die. | 9330 | 2720 | 4 | 3.975x5.000 | 248 | 2000 | 67.43 | 540 | 61.76 | 60.16 | 5.16 | 7292 | 14.18 | 12.51 | 13.04 | 13.22 | 11.63 |
| MF285 Diesel.................1171 | Die. | 11760 | 4110 | 4 | 4.500x5.000 | 318 | 2000 | 81.96 | 1000 | 81.96 | 70.53 | 7.77 | 8846 | 14.98 | 12.68 | 12.85 | 12.90 | 11.34 |
| MF1085 Diesel...............1133 | Die. | 14385 | 2845 | 4 | 4.500x5.000 | 318 | 2000 | 81.58 | 1000 | 81.58 | 70.76 | 5.58 | 10355 | 15.82 | 13.21 | 13.43 | 13.15 | 11.55 |
| MF1105 Diesel...............1132 | Die. | 16725 | 4405 | 6 | 3.875x5.000 | 354 | 2200 | 100.72 | 1000 | 96.43 | 86.26 | 4.36 | 11365 | 15.43 | 11.53 | 12.37 | 11.55 | 9.81 |
| MF1135 Diesel...............1135 | Die. | 18900 | 5350 | 6 | 3.875x5.000 | 354 | 2200 | 120.84 | 1000 | 118.47 | 106.52 | 4.56 | 13955 | 16.18 | 12.24 | 13.22 | 12.56 | 10.71 |
| MF1155 Diesel...............1134 | Die. | 20460 | 5554 | 8 | 4.250x4.75 | 540 | 2200 | 140.97 | 1000 | 134.11 | 124.90 | 4.40 | 15630 | 15.66 | 12.77 | 13.15 | 13.00 | 11.45 |
| MF1505 Diesel...............1172 | Die. | 20970 | 3010 | 8 | 4.500x5.000 | 636 | 2800 | 174.46 | 1000 | 175.95 | 154.10 | 6.98 | 17226 | 14.55 | 11.41 | 12.27 | 11.43 | 9.54 |
| MF1805 Diesel...............1173 | Die. | 22790 | 4790 | 8 | 4.500x5.000 | 636 | 2800 | 192.65 | 1000 | 191.60 | 170.17 | 6.95 | 18781 | 14.77 | 12.14 | 12.76 | 12.41 | 10.77 |
| 2675, 8-Speed ................1321 | Die. | 14280 | 1930 | 6 | 3.875x5.0 | 354 | 2500 | 100.84 | 1000 | 95.00 | 86.18 | 5.91 | 10226 | 15.00 | 11.14 | 11.48 | 11.57 | 10.01 |
| 2675, 24-Speed ..............1309 | Die. | 14495 | 2065 | 6 | 3.875x5.0 | 354 | 2500 | 103.29 | 1000 | 96.67 | 87.47 | 5.09 | 9674 | 15.43 | 11.56 | 11.76 | 11.49 | 9.95 |
| 2705, 8-Speed ................1322 | Die. | 16800 | 4295 | 6 | 3.875x5.0 | 354 | 2500 | 121.11 | 1000 | 114.44 | 101.47 | 6.17 | 12588 | 16.84 | 11.22 | 12.54 | 11.30 | 9.45 |
| 2705, 24-Speed ..............1310 | Die. | 17490 | 4895 | 6 | 3.875x5.0 | 354 | 2500 | 122.20 | 1000 | 115.85 | 104.23 | 5.30 | 13085 | 16.65 | 11.22 | 12.74 | 11.27 | 9.23 |
| 2745 Diesel .....................1311 | Die. | 19490 | 4300 | 8 | 4.25x4.75 | 539 | 2600 | 143.40 | 1000 | 132.21 | 125.17 | 5.51 | 15386 | 15.40 | 10.62 | 11.96 | 11.13 | 9.39 |
| 2775 ...............................1278 | Die | 20440 | 4210 | 8 | 4.63x4.75 | 640 | 2600 | 165.95 | 1000 | 149.86 | 143.70 | 5.72 | 17407 | 16.05 | 11.50 | 12.57 | 11.52 | 9.85 |
| MF2775 8 Speed.............1389 | Die. | 20170 | 4365 | 8 | 4.63x4.75 | 640 | 2600 | 162.09 | 1000 | 146.87 | 139.68 | 5.73 | 16766 | 15.78 | 11.19 | 12.45 | 11.68 | 9.56 |
| 2805 24-Speed ................1258 | Die. | 21170 | 5540 | 8 | 4.630x4.750 | 640 | 2500 | 194.62 | 1000 | 181.77 | 160.72 | 7.10 | 17369 | 16.29 | 11.33 | 12.21 | 11.14 | 9.27 |
| MF2805 8 Speed.............1399 | Die. | 21430 | 5395 | 8 | 4.63x4.75 | 640 | 2500 | 190.81 | 1000 | 186.29 | 164.58 | 5.41 | 17647 | 16.59 | 10.97 | 12.41 | 11.43 | 9.58 |
| 4800 Die 12 & 18 Speed 1342 | Die. | 30520 | None | 8 | 5.5 4.75 | 903 | 2600 | 179.31 | 1000 | 172.88 | 159.08 | 4.82 | 25294 | 15.10 | 10.12 | 12.13 | 10.73 | 8.39 |
| 4840 Die 12 & 18 Speed 1343 | Die. | 30920 | None | 8 | 5.5 4.75 | 903 | 2600 | 210.67 | 1000 | 210.61 | 186.36 | 4.84 | 28191 | 15.57 | 10.77 | 12.41 | 11.25 | 9.32 |
| 4880 Die 12 & 18 Speed 1344 | Die. | 32450 | 1360 | 8 | 5.5 x4.75 | 903 | 2600 | 272.81 | 1000 | 267.38 | 244.57 | 6.54 | 29272 | 16.80 | 11.51 | 13.50 | 11.98 | 9.58 |
| MF4900 18 Speed..........1391 | Die. | 33940 | 2975 | 8 | 5.5 x4.75 | 903 | 2600 | 320.55 | 1000 | 323.88 | 278.78 | 6.53 | 30090 | 16.80 | 11.95 | 13.26 | 11.82 | 9.87 |
| **Minneapolis-Moline** | | | | | | | | | | | | | | | | | | |
| G955...............................1161 | Die. | 12060 | None | 6 | 4.375x5.000 | 451 | 1800 | 98.38 | 1000 | 98.82 | 83.40 | 5.44 | 8374 | 13.92 | 11.93 | 11.26 | 11.76 | 10.29 |
| G1355 Diesel ..................1141 | Die. | 18070 | 974 | 6 | 4.750x5.500 | 585 | 2200 | 142.62 | 1007 | 142.62 | 128.95 | 7.89 | 14178 | 15.21 | 12.47 | 13.61 | 12.85 | 11.23 |
| **Oliver** | | | | | | | | | | | | | | | | | | |
| 2255 Diesel ....................1140 | Die. | 17990 | 1583 | 8 | 4.500x4.500 | 573 | 2600 | 146.72 | 1000 | 147.65 | 126.13 | 5.70 | 14770 | 15.66 | 12.47 | 13.43 | 12.95 | 11.25 |
| **Same** | | | | | | | | | | | | | | | | | | |
| Panter 4WD Diesel .........1185 | Die. | 12000 | 2772 | 5 | 3.860x4.720 | 276 | 2200 | 80.02 | 1000 | 79.10 | 66.67 | 5.75 | 10389 | 14.79 | 12.74 | 12.40 | 12.30 | 10.00 |
| Tiger 100 Diesel .............1[illegible]68 | Die. | 11620 | 2500 | 5 | 4.13x4.72 | 317 | 2200 | 90.45 | 1000 | 89.42 | 78.84 | 6.35 | 9116 | 15.48 | 13.22 | 12.41 | 13.08 | 11.26 |
| Buffalo 4WD Diesel........1186 | Die. | 13795 | 3708 | 6 | 4.130x4.720 | 380 | 2200 | 104.94 | 1000 | 104.94 | 88.24 | 4.24 | 10941 | 15.23 | 12.78 | 12.47 | 12.44 | 10.76 |
| **Satoh** | | | | | | | | | | | | | | | | | | |
| S750DD & S750D 9 Speed ..............1347 | Die. | 5550 | 1620 | 3 | 3.386x4.016 | 108.4 | 2500 | 33.45 | 540 | 28.11 | 28.99 | 5.93 | 4295 | 11.92 | 10.89 | 9.86 | 11.18 | 9.58 |
| **Steiger** | | | | | | | | | | | | | | | | | | |
| Wildcat III ST-210 & RC-210.......................1237 | Die. | 22260 | None | 8 | 4.500x5.000 | 636 | 2800 | .... | .... | .... | 171.44 | 5.84 | 21052 | .... | .... | 12.71 | 12.58 | 10.82 |
| Bearcat II ........................1162 | Die. | 23020 | 1585 | 8 | 4.500x5.000 | 636 | 2800 | .... | .... | .... | 180.69 | 6.57 | 22622 | .... | .... | 12.79 | 12.37 | 10.82 |
| Bearcat III ST-220 ..........1246 | Die. | 29380 | None | 6 | 5.500x6.000 | 855 | 2100 | .... | .... | .... | 175.58 | 4.84 | 26936 | .... | .... | 13.24 | 12.60 | 11.04 |
| Bearcat III ST-225(1).....1414 | Die. | 30005 | 465 | 6 | 4.75x6.0 | 638 | 2100 | .... | .... | .... | 197.69 | 5.47 | 28805 | .... | .... | 13.99 | 13.54 | 11.65 |
| Bearcat III PT225 ..........1272 | Die. | 30825 | None | 6 | 4.75x6.00 | 638 | 2200 | (1) | .... | .... | 180.86 | 6.33 | 29749 | .... | .... | 12.02 | 10.80 | 9.29 |
| | | (1) Serial numbers 109-00328 and higher | | | | | | | | | 187.59 | 5.58 | 29953 | .... | .... | 12.81 | 11.52 | 10.07 |
| Cougar II..........................1170 | Die. | 27995 | 1305 | 6 | 4.750x6.000 | 638 | 2200 | .... | .... | .... | 228.15 | 4.44 | 26432 | .... | .... | 13.15 | 12.77 | 11.59 |
| Cougar III ST-250...........1239 | Die. | 29800 | None | 6 | 4.750x6.000 | 638 | 2200 | .... | .... | .... | 210.35 | 6.38 | 26612 | .... | .... | 12.74 | 11.90 | 10.36 |
| Cougar III ST-250...........1452 | Die. | (6) | (6) | 6 | 4.75x6.0 | 638 | 2100 | .... | .... | .... | 215.98 | 5.39 | 26866 | .... | .... | 15.16 | 14.40 | 12.76 |
| Cougar III ST-251 ...........1233 | Die. | 30840 | None | 6 | 5.500x6.000 | 855 | 2100 | .... | .... | .... | 205.82 | 7.98 | 26880 | .... | .... | 14.74 | 13.69 | 11.60 |
| Cougar III PT270 ...........1273 | Die. | 32210 | 1495 | 6 | 4.75x6.00 | 638 | 2200 | (1) | .... | .... | 219.39 | 6.29 | 30122 | .... | .... | 12.73 | 11.81 | 10.23 |

# Nebraska Tractor Tests Summarized (Tests from 1973 through 1982)

| | | | | | | ENGINE | | | | | | | | | —FUEL CONSUMPTION (HP Hours Per Gallon) @:— | | —Varying Drawbar Power— | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAKE AND MODEL OF TRACTOR | Test No. | Fuel Used | Weight With Ballast | Lbs. Ballast Carried | No. of Cylinders | Bore and Stroke | Displacement Cu. in. | Rated RPM Dwbr. | Max. PTO HP @ Rated Engine RPM | Std. PTO RPM | Max. PTO HP @ Std. PTO RPM | Max. Drawbar HP | MPH @ Max. Dwbr. HP | Max. Lbs. Pull | Max. PTO HP @ Std. PTO RPM | PTO Average @ Varying Power | Max. Available Power | 75% of Pull Max. Power | 50% of Pull @ Max. Power |
| **Steiger Cont.** | | | | | | | | | | | | | | | | | | | |
| Cougar III PTA 280 | 1402 | Die. | 33675 | 2895 | 6 | 5.5x6.0 | 855 | 2100 | .... | .... | .... | 224.92 | 5.54 | 15215 | .... | .... | 13.74 | 12.54 | 10.44 |
| Cougar III PTA-280 | 1413 | Die. | 33150 | 2370 | 6 | 5.4x6.5 | 893 | 2100 | .... | .... | .... | 236.55 | 7.07 | 32085 | .... | .... | 14.24 | 13.14 | 11.19 |
| | | | | | | | | | | | | 224.54 | 4.89 | 29950 | .... | .... | 12.97 | 12.45 | 10.76 |
| Cougar III ST-270 | 1238 | Die. | 29930 | None | 6 | 4.750x6.000 | 638 | 2200 | .... | .... | .... | 228.96 | 6.38 | 25371 | .... | .... | 13.32 | 12.62 | 10.96 |
| Cougar III ST-280 | 1401 | Die. | 33105 | 2625 | 6 | 5.5x6.0 | 855 | 2100 | .... | .... | .... | 236.82 | 5.37 | 16530 | .... | .... | 14.55 | 13.20 | 11.05 |
| Cougar III ST-280 | 1412 | Die. | 33345 | 2705 | 6 | 5.4x6.5 | 893 | 2100 | .... | .... | .... | 246.13 | 2.41 | 32099 | .... | .... | 14.85 | 13.76 | 11.69 |
| Panther III ST-310 | 1235 | Die. | 30850 | None | 6 | 5.500x6.000 | 855 | 2100 | .... | .... | .... | 261.78 | 7.90 | 26757 | .... | .... | 13.95 | 13.09 | 11.02 |
| Panther III ST-325 | 1236 | Die. | 31080 | None | 6 | 5.400x6.500 | 893 | 2100 | .... | .... | .... | 281.94 | 7.93 | 28189 | .... | .... | 14.82 | 14.19 | 12.64 |
| Panther III PTA-325 | 1355 | Die. | 33960 | 3140 | 6 | 5.4x6.5 | 893 | 2100 | .... | .... | .... | 274.88 | 5.34 | 31876 | .... | .... | 14.26 | 13.45 | 11.55 |
| Panther III PT350 | 1274 | Die. | 34000 | 2855 | 8 | 5.4x4.75 | 903 | 2600 | (1) | .... | .... | 305.48 | 6.51 | 32276 | .... | .... | 14.91 | 13.75 | 11.32 |
| | | | | | | | | | | | | 311.64 | 7.38 | 32059 | .... | .... | 15.03 | Not Tested | |
| Tiger II | 1169 | Die. | 29930 | 2330 | 8 | 5.500x4.750 | 903 | 2600 | .... | .... | .... | 270.21 | 6.73 | 28097 | .... | .... | 13.88 | 12.70 | 10.61 |
| Tiger III ST450 | 1282 | Die. | 47370 | 4645 | 6 | 6.25x6.25 | 1150 | 1700 | .... | .... | .... | 385.74 | 5.23 | 42715 | .... | .... | 15.57 | Not Tested | |
| **Versatile** | | | | | | | | | | | | | | | | | | | |
| 555 Diesel | 1331 | Die. | 25980 | 6330 | 8 | 4.625x4.125 | 555 | 2850 | 182.25 | 1000 | 184.35 | 154.20 | 4.56 | 23533 | 16.33 | 11.15 | 12.96 | 11.17 | 8.83 |
| 835 12 Speed | 1356 | Die. | 28000 | 3720 | 6 | 5.5x6.0 | 855 | 2100 | 198.23 | 1009 | 198.23 | 179.07 | 6.13 | 26380 | 15.13 | 11.36 | 13.16 | 11.87 | 9.70 |
| 875 Diesel | 1279 | Die. | 29500 | 4980 | 6 | 5.5x6.0 | 855 | 2100 | 248.07 | 1008 | 248.07 | 228.35 | 9.12 | 24457 | 15.45 | 11.76 | 13.60 | 12.28 | 10.40 |
| 875 Diesel | 1332 | Die. | 29480 | 4160 | 6 | 5.5x6.0 | 855 | 2100 | 247.16 | 1008 | 247.16 | 221.66 | 4.86 | 26795 | 16.06 | 12.02 | 14.35 | 12.53 | 10.34 |
| 895 Diesel, 12 Speed | 1335 | Die. | 32500 | 7880 | 6 | 5.5x6.0 | 855 | 2100 | .... | .... | .... | 261.63 | 6.45 | 29402 | .... | .... | 15.15 | 13.72 | 11.57 |
| **White** | | | | | | | | | | | | | | | | | | | |
| 2-30 8 Speed | 1373 | Die. | 3853 | 848 | 3 | 3.386x3.386 | 91.4 | 2600 | 28.33 | 540 | 24.50 | 25.81 | 8.35 | 2816 | 12.03 | 10.27 | 10.77 | 11.42 | 9.61 |
| 2-35 8 Speed | 1374 | Die. | 3970 | 800 | 3 | 3.386x4.02 | 108.4 | 2400 | 32.84 | 540 | 30.94 | 30.37 | 8.00 | 2978 | 12.68 | 10.86 | 11.23 | 11.73 | 10.35 |
| 2-45 20 Speed | 1395 | Die. | 6630 | 660 | 4 | 3.858x3.62 | 169.3 | 2250 | 43.73 | 540 | 36.62 | 37.32 | 3.97 | 4455 | 12.70 | 11.25 | 10.96 | 11.00 | 9.66 |
| 2-50 Field Boss | 1231 | Die. | 6880 | 2325 | 3 | 3.940x4.330 | 158 | 2500 | 47.02 | 540 | 43.94 | 41.88 | 4.80 | 5640 | 15.80 | 13.03 | 13.26 | 13.49 | 11.97 |
| 2-60 Field Boss | 1232 | Die. | 8990 | 3830 | 4 | 3.940x4.330 | 211 | 2400 | 63.22 | 540 | 54.35 | 54.78 | 5.07 | 7352 | 17.63 | 13.82 | 14.40 | 13.87 | 11.93 |
| 2-62 20 Speed | 1396 | Die. | 6875 | 635 | 4 | 4.016x4.33 | 219 | 2200 | 61.46 | 540 | 54.25 | 51.63 | 6.05 | 4695 | 16.31 | 13.85 | 13.76 | 13.49 | 12.08 |
| 2-70 Diesel | 1212 | Die. | 9630 | 1000 | 6 | 3.875x4.000 | 283 | 2200 | 70.71 | 994 | 70.71 | 59.47 | 6.40 | 7550 | 14.56 | 12.28 | 11.92 | 12.13 | 10.72 |
| 2-85 Diesel | 1213 | Die. | 12280 | 580 | 6 | 3.875x5.000 | 354 | 2200 | 85.54 | 1007 | 85.54 | 71.93 | 8.13 | 9309 | 14.62 | 11.72 | 12.24 | 11.64 | 9.71 |
| 2-105 Field Boss | 1181 | Die. | 11810 | None | 6 | 3.875x5.000 | 354 | 2200 | 105.61 | 1007 | 105.61 | 90.81 | 6.34 | 9212 | 15.76 | 12.02 | 12.89 | 11.95 | 10.00 |
| 2-135 | 1275 | Die. | 16360 | 2225 | 6 | 4.56x4.87 | 478 | 2200 | 137.64 | 1000 | 138.03 | 117.67 | 8.93 | 11907 | 14.91 | 11.38 | 12.31 | 11.42 | 9.73 |
| 2-150 Field Boss | 1182 | Die. | 16940 | None | 6 | 4.750x5.500 | 585 | 2200 | 147.49 | 1007 | 147.49 | 127.49 | 5.63 | 15059 | 14.46 | 11.90 | 12.07 | 12.14 | 10.63 |
| 4-150 Field Boss | 1159 | Die. | 16960 | None | 8 | 4.500x5.000 | 636 | 2800 | 151.87 | 1000 | 152.45 | 133.34 | 6.34 | 16925 | 15.09 | 11.45 | 12.46 | 11.34 | 9.21 |
| 2-155 | 1276 | Die. | 16650 | None | 6 | 4.56x4.87 | 478 | 2200 | 157.73 | 1000 | 162.37 | 139.68 | 9.04 | 14512 | 15.38 | 11.91 | 12.69 | 11.53 | 9.97 |
| 4-175 Field Boss | 1375 | Die. | ........ | ........ | 8 | 4.5x5.0 | 636 | 2600 | 151.69 | 1000 | 151.29 | 133.72 | 6.39 | 19905 | 15.50 | 11.70 | 12.96 | 11.98 | 10.01 |
| 2-180 | 1287 | Die. | 18280 | None | 8 | 4.5x5.0 | 636 | 2800 | 181.89 | 1000 | 181.89 | 163.64 | 6.50 | 15499 | 14.38 | 11.66 | 12.85 | 12.48 | 10.56 |
| 4-180 Field Boss | 1184 | Die. | 20600 | None | 8 | 4.500x5.000 | 636 | 2800 | 181.07 | 1000 | 182.30 | 156.54 | 4.59 | 20469 | 14.19 | 11.47 | 11.79 | 11.56 | 9.98 |
| 4-210 Field Boss | 1318 | Die. | 23735 | None | 8 | 4.5x5.0 | 636 | 2800 | 182.44 | 1000 | 182.44 | 162.25 | 5.89 | 22934 | 14.26 | 11.53 | 12.34 | 12.10 | 10.25 |
| **Yanmar** | | | | | | | | | | | | | | | | | | | |
| YM240 Diesel | 1199 | Die. | 3305 | 1355 | 2 | 3.543x3.543 | 70 | 2400 | 19.76 | 540 | 18.75 | 16.60 | 4.86 | 2442 | 15.05 | 12.64 | 12.35 | 11.95 | 10.37 |
| YM226D Diesel | 1442 | Die. | 3380 | 1080 | 3 | 2.95x3.35 | 68.7 | 2600 | 19.42 | 540 | 17.87 | 16.14 | 4.78 | 2073 | 15.07 | 11.67 | 11.92 | 10.93 | 9.26 |
| YM276D Diesel | 1443 | Die. | 4110 | 1405 | 3 | 3.31x3.35 | 86.2 | 2600 | 23.00 | 540 | 22.82 | 18.93 | 5.78 | 2412 | 14.35 | 11.06 | 11.08 | 10.57 | 8.90 |
| YM336D Diesel | 1444 | Die. | 5020 | 1615 | 3 | 3.31x3.54 | 91.3 | 2600 | 26.98 | 540 | 25.63 | 23.00 | 6.28 | 3086 | 14.27 | 11.32 | 11.39 | 10.66 | 9.64 |

(1) Equipped with controlled hydrostatic pto with 105 output horsepower at 1000 rpm. (6) Tested without ballast, weight 29965.

*The business magazine of the farm & industrial equipment indu*

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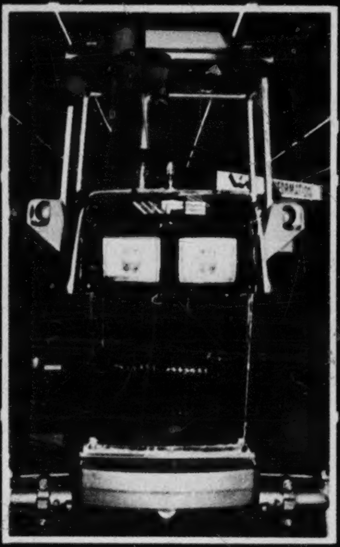

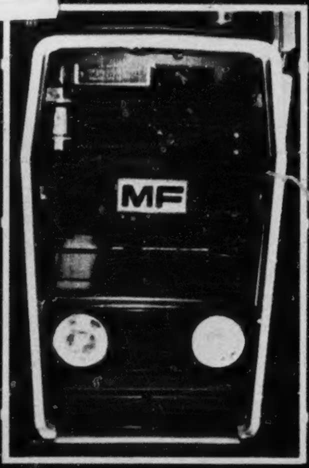

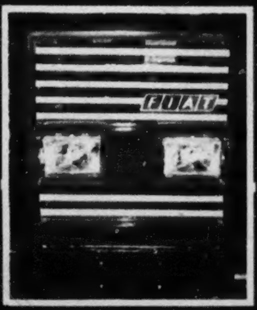

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April 1983

TWO DOLLARS

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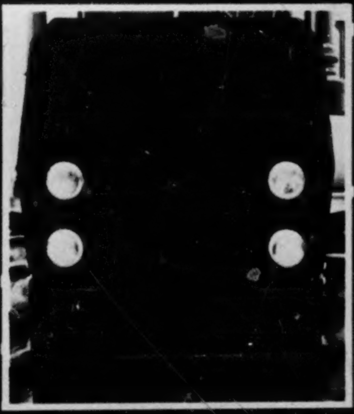

## TRACTORS

### Where the HP Went in 1982

### Makes, Models on '83 Market

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Part II

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INTERTEC PUBLISHING CORP.

# Implement & Tractor

*The business magazine of the farm & industrial equipment industry*

April 1983 • Vol. 98 • No. 6

page 8

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**8: Affordable, Friendly Computers** are a reality, and the new technology promises even more possibilities for in-house data processing systems at many dealerships.

**12: Less Downtime for Tomorrow's Tractors?** The chances that bigger plow-pullers will stay in service longer are assessed in the conclusion of our Future Tractor series.

**16: Wage Rates for Dealership Employees.** A look at average hourly pay scales in 12 states for 1981 and 1982. How does your compensation plan stack up?

**18: Annual Planning Pays Off.** John Romsdal learned the value of thinking ahead, and shares his ideas with other dealers.

**20: Ford's 1983 Model Introduction.** Some new blue tractors were displayed, but the big news was a 3-year warranty program.

**28: Where Horsepower Sales Went in 1982.** This annual summary of FIEI figures shows the sales distribution of tractors by horsepower range across the 50 states.

**30: Tractors on the Market, 1983.** All agricultural tractors sold in North America, listed brand-to-brand, side-by-side and top-to-bottom, in 2- and 4-wheel drive. Suitable for framing.

**On the cover...**Just a glimpse at a few of the makes and models of tractors offered on the 1983 North American market.

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# What's Ahead...

I&T
SINCE 1886

April 1983

FEBRUARY U.S. RETAIL SALES IMPROVED IN SOME CATEGORIES, according to the flash report of the Farm & Industrial Equipment Institute:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | February | | | January-February | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| Farm Wheel Tractors: | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 2,256 | 2,177 | + 3.6 | 4,324 | 4,575 | - 5.5 |
| 40 to 100 hp | 2,492 | 2,487 | + .2 | 5,082 | 5,913 | -14.1 |
| 100 to 140 hp | 1,010 | 1,459 | -30.8 | 2,429 | 3,958 | -38.6 |
| Over 140 hp | 536 | 779 | -31.2 | 1,462 | 2,033 | -28.3 |
| Total 2-wheel drive | 6,294 | 6,902 | - 8.8 | 13,297 | 16,484 | -19.3 |
| 4-wheel drive | | | | | | |
| Under 200 hp | 74 | 324 | -77.2 | 260 | 627 | -57.9 |
| Over 200 hp | 118 | 244 | -51.6 | 324 | 613 | -47.1 |
| Total 4-wheel drive | 192 | 568 | -66.2 | 584 | 1,230 | -52.5 |
| Total Tractors | 6,486 | 7,470 | -13.2 | 13,881 | 17,714 | -21.6 |
| Combines (S-P) | 707 | 510 | +38.6 | 2,503 | 1,884 | +32.9 |
| Balers* | 324 | 202 | +60.4 | 715 | 598 | +19.6 |
| Forage Harvesters** | 147 | 128 | +14.8 | 318 | 448 | -29.0 |
| Mower-Conditioners | 407 | 367 | +10.9 | 970 | 1,007 | - 3.7 |

*Bales under 200 lbs. **Shear-bar type.

THERE WILL BE AN ANNUAL NEED FOR 59,780 AG SCHOOL GRADUATES through 1985, according to T. B. Kinney, Jr., administrator of the USDA Ag Research Service, but there will be only 51,976 actual ag graduates yearly through the period. Enrollment in ag schools has been in decline since 1978.

FARM EQUIPMENT DEALERSHIP CLOSINGS, 1981-1982, as tallied from a survey by the Farm Equipment Manufacturers Assn. of state, provincial and regional dealer association managers in North America: For the 24 months, 880 dealers out. For the first half of 1982, 249 out; for the second half, 205. International Harvester has pointed out to I&T on several occasions that its net losses were not as severe as the survey indicated; e.g., net dealer loss in the first half of 1982 was 41.

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# Dealership Wages Rose in 1982, But Some Salesmen Suffered

■IT WAS a "blah" year for equipment salesmens' salaries, and 1982 provided generally modest increases in wages and labor rates at agricultural dealerships, according to surveys pulled together by *Implement & Tractor.*

Figures provided by five dealer associations covering 12 states fell short of giving a full national picture, but offer plenty of insights in to what various jobs paid in 1982 compared with 1981.

There is no uniform survey and reporting method used by associations, and some surveys may have included industrial and lawn-and-garden shops along with agricultural dealerships. Thus, the results can't be taken as gospel. But surprising consistency within some job categories tends to support the validity of the figures.

Wages reported here are averages, and do not show the wide range of pay found in most job categories. Benefits like profit sharing, vacations, company cars and insurance are also not included.

Survey information for the Far West was included for comparison only, but not included in the Summary column. Far West made major changes in reporting between 1981 and 1982, making comparisons difficult. Far West also reports a different statistical measure from the other associations.

## 1982 Wages, Shop Rates, and How They Changed

| | | Summary 316 dealers | No. & So. Carolina 48 dealers | Ohio 84 dealers | Wisconsin 149 dealers | Pacific Northwest 35 dealers | Far West for comparison only 86 dealers |
|---|---|---|---|---|---|---|---|
| Labor | '82 | $19.38 | 18.31 | 19.72 | 19.54 | n/a | 28.22 |
| Rate | '81 | 18.76 | 18.03 | 19.16 | 18.78 | | |
| Pct. change | | 3.30%<br>see note | 1.50% | 2.90% | 4.00% | | |
| Service Manager | '82 | 8.16 | 8.42 | 7.56 | 7.89 | 10.38 | 9.11 |
| | '81 | 7.50 | 7.77 | 7.39 | 6.82 | 10.26 | |
| Pct. Change | | 8.80% | 8.40% | 2.30% | 15.70% | 1.10% | |
| Regular Mechanic | '82 | 6.06 | 6.06 | 5.66 | 5.77 | 8.26 | 7.84 |
| | '81 | 5.90 | 5.82 | 5.49 | 5.73 | 7.69 | |
| Pct. Change | | 2.70% | 4.10% | 3.10% | 0.70% | 7.40% | |
| Set-Up; | '82 | 5.19 | 4.59 | 5.34 | 4.99 | 6.50 | n/a |
| Helper | '81 | 5.08 | 4.25 | 5.27 | 4.92 | 6.45 | |
| Pct. Change | | 2.20% | 8.00% | 1.30% | 1.40% | 0.80% | |
| Truck Driver | '82 | 5.83 | 5.34 | 5.84 | 5.58 | 7.56 | 8.21 |
| | '81 | 5.56 | 4.50 | 5.51 | 5.50 | 7.43 | |
| Pct. Change | | 4.90% | 18.60% | 6.00% | 1.50% | 1.70% | |
| Parts Manager | '82 | 6.93 | 6.46 | 6.65 | 6.65 | 9.42 | 8.28 |
| | '81 | 6.71 | 6.17 | 6.67 | 6.31 | 9.26 | |
| Pct. Change | | 3.30% | 4.70% | −0.30% | 5.40% | −1.70% | |
| Partsman | '82 | 5.83 | 5.88 | 5.69 | 5.60 | 7.10 | 6.99 |
| | '81 | 5.39 | 4.94 | 5.64 | 5.32 | 7.05 | |
| Pct. Change | | 8.20% | 19.00% | 0.90% | 5.30% | 0.70% | |
| Salesman | '82 | see | 16,522 | 20,400 | 19,800 | 23,570 | 19,257 |
| | '81 | note | 16,809 | 19,775 | '81 n/a | 23,000 | 28,575 |
| Pct. Change | | | −1.70% | 3.20% | | 2.50% | −32.60% |

**Sources:** Carolinas Farm & Power Equipment Dealers Assn., Inc., covering North and South Carolina; Ohio Assn. of Farm & Power Equipment Retailers; Wisconsin Farm Equipment Assn.; Pacific Northwest Hardware & Implement Assn., covering Alaska, Idaho, Oregon and Washington; Far West Equipment Dealers Assn., covering Arizona, California, Hawaii and Nevada.

**Notes:** Labor rate summary excludes Pacific Northwest. No summary for salesmen because total number of salesmen reported not available.

All figures express mean (average) except Far West, which reports the median (middle number in a series.) In statistically normal distribution, mean and median are equal.

For ease of comparison, annual salary figures for managers were converted to hourly rates based on 2,000 working hours: 40 hrs. per week, 50 weeks per year. Reports generally showed managers work 8 to 12 more hours per week, but receive vacations longer than 2 weeks.

# FARM TRACTOR SALES: WHERE

■LAST YEAR, when I&T published this table, we estimated that units of horsepower sold in 1981 came to approximately 9.4 million, compared with 10.9 million in 1980.

Reviewing the process we followed at that time, it seems likely that our estimates for those two years were probably a little too liberal, and that 9.2 milion for 1981 and 10.6 million for 1980 would have been more accurate.

As for 1982, using our more conservative method of estimating, we are setting the total units of horsepower sold at 8.03 million.

All horsepower brackets shared in the unit sales volume decline, which, at 77,144, was off by 25.7 per cent from the previous year. As for states, some fared worse than others, and only two—New Hampshire and New Jersey—showed an improvement in unit sales. (The U.S. government also showed an increase—from 17 to 98 units!)

**Inventories**

Reduced sales volumes were accompanied by changes in levels of inventory. In terms of total farm tractor units, the sales decline of 25.7 per cent was accompanied by an inventory reduction of 9 per cent.

However, the reductions were not uniform, and in some horsepower groups, the inventory levels went up. Inventories of tractors in the 40-69 horsepower brackets declined from 24,914 units as of Dec. 31, 1981, to 18,487 twelve months later. For the 70-99-hp group, the decline was from 13,531 to 11,256. And four-wheel-drive tractor inventory levels came down from 6,695 units to 5,421 in 1982.

As for two-wheel-drive, over-100-hp tractors, there was a slight reduction in the 100-129-hp group, from 10,685 to 10,572 units. There was a greater reduction in the 130-149-hp bracket—from 13,614 to 11,951. But for two-wheelers of 150 or more horsepower, the inventory level rose from 10,549 to 13,852 units.

| | Two-Wheel-Drive Tractors | | | | | | |
|---|---|---|---|---|---|---|---|
| State | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-99 | 100-119 |
| Alabama | 366 | 184 | 124 | 94 | 101 | 21 | 56 |
| Alaska | 3 | 1 | 3 | ..... | ..... | 1 | 1 |
| Arizona | 41 | 12 | 51 | 28 | 75 | 25 | 48 |
| Arkansas | 499 | 206 | 185 | 77 | 67 | 18 | 62 |
| California | 378 | 403 | 651 | 390 | 471 | 75 | 179 |
| Colorado | 46 | 59 | 57 | 22 | 46 | 20 | 53 |
| Connecticut | 38 | 25 | 25 | 12 | 24 | 7 | 6 |
| Delaware | 8 | 13 | 10 | 8 | 9 | 1 | 13 |
| Florida | 319 | 230 | 288 | 332 | 201 | 15 | 100 |
| Georgia | 549 | 240 | 231 | 152 | 164 | 27 | 82 |
| Hawaii | 9 | 12 | 2 | 5 | 2 | ..... | 4 |
| Idaho | 48 | 63 | 79 | 32 | 85 | 38 | 106 |
| Illinois | 161 | 186 | 252 | 191 | 259 | 74 | 308 |
| Indiana | 137 | 140 | 168 | 96 | 211 | 29 | 140 |
| Iowa | 65 | 108 | 221 | 171 | 387 | 131 | 603 |
| Kansas | 64 | 63 | 89 | 59 | 138 | 87 | 302 |
| Kentucky | 826 | 520 | 403 | 235 | 263 | 60 | 108 |
| Louisiana | 488 | 171 | 187 | 213 | 67 | 22 | 55 |
| Maine | 54 | 58 | 41 | 12 | 28 | 4 | 29 |
| Maryland | 106 | 91 | 57 | 41 | 73 | 12 | 50 |
| Massachusetts | 35 | 43 | 19 | 20 | 15 | 3 | 6 |
| Michigan | 161 | 191 | 237 | 139 | 218 | 66 | 164 |
| Minnesota | 61 | 123 | 222 | 147 | 367 | 150 | 444 |
| Mississippi | 397 | 166 | 191 | 165 | 91 | 17 | 71 |
| Missouri | 334 | 239 | 346 | 136 | 274 | 79 | 227 |
| Montana | 109 | 49 | 87 | 40 | 93 | 28 | 91 |
| Nebraska | 25 | 38 | 43 | 36 | 150 | 86 | 352 |
| Nevada | 9 | 13 | 18 | 2 | 4 | 5 | 4 |
| New Hampshire | 44 | 48 | 26 | 12 | 16 | 4 | 5 |
| New Jersey | 95 | 51 | 25 | 18 | 20 | 6 | 9 |
| New Mexico | 48 | 33 | 22 | 45 | 5 | 11 | 18 |
| New York | 163 | 257 | 267 | 182 | 397 | 83 | 178 |
| North Carolina | 598 | 322 | 231 | 121 | 284 | 42 | 121 |
| North Dakota | 9 | 25 | 30 | 19 | 66 | 33 | 199 |
| Ohio | 237 | 233 | 269 | 169 | 227 | 61 | 181 |
| Oklahoma | 334 | 172 | 171 | 96 | 134 | 84 | 234 |
| Oregon | 213 | 182 | 123 | 43 | 84 | 28 | 61 |
| Pennsylvania | 246 | 250 | 310 | 122 | 259 | 79 | 134 |
| Rhode Island | 6 | 1 | 2 | 2 | 1 | ..... | ..... |
| South Carolina | 222 | 108 | 92 | 64 | 91 | 9 | 30 |
| South Dakota | 10 | 22 | 27 | 25 | 159 | 90 | 268 |
| Tennessee | 609 | 355 | 253 | 102 | 170 | 38 | 83 |
| Texas | 1,690 | 672 | 959 | 584 | 482 | 179 | 363 |
| Utah | 48 | 87 | 70 | 40 | 46 | 22 | 50 |
| Vermont | 31 | 50 | 54 | 19 | 46 | 6 | 16 |
| Virginia | 437 | 250 | 214 | 115 | 214 | 22 | 78 |
| Washington | 368 | 322 | 160 | 72 | 73 | 18 | 36 |
| West Virginia | 120 | 71 | 75 | 20 | 22 | 4 | 9 |
| Wisconsin | 88 | 203 | 369 | 282 | 568 | 158 | 412 |
| Wyoming | 17 | 16 | 22 | 11 | 38 | 20 | 34 |
| U.S. Government | 2 | ..... | 2 | 92 | ..... | ..... | 2 |
| Miscellaneous | 39 | 28 | 27 | 122 | 16 | ..... | ..... |
| **TOTAL** | **11,011** | **7,405** | **8,087** | **5,232** | **7,301** | **2,098** | **6,185** |

*Turn page for:* **FARM TRACTORS,** Makes & Models on the 1983 North American Market

# AND WHAT HORSEPOWER, 1982

## 1982 Retail Sales of Farm Wheel Tractors by PTO Horsepower (in units)

|  |  |  |  |  |  | Four-Wheel Drive Tractors |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 120-129 | 130-139 | 140-149 | 150-179 | 180 & over | Total 2-Wheel Drive | Under 200 | 200-249 | 250 & over | Total 4-Wheel Drive | All Farm Wheel Tractors | State |
| 5 | 79 | 11 | 47 | 20 | 1,108 | 8 | 5 | 1 | 14 | 1,122 | Alabama |
| ..... | ..... | ..... | 1 | ..... | 10 | ..... | ..... | ..... | ... | 10 | Alaska |
| 5 | 46 | 1 | 29 | 64 | 425 | 36 | 11 | 26 | 73 | 498 | Arizona |
| 13 | 144 | 49 | 194 | 258 | 1,772 | 26 | 59 | 40 | 125 | 1,897 | Arkansas |
| 38 | 169 | 14 | 125 | 83 | 2,976 | 67 | 84 | 100 | 251 | 3,227 | California |
| 22 | 160 | 16 | 70 | 63 | 634 | 37 | 39 | 45 | 121 | 755 | Colorado |
| ..... | 7 | ..... | 1 | ..... | 145 | 2 | ..... | ..... | 2 | 147 | Connecticut |
| 5 | 5 | ..... | 2 | 5 | 79 | 4 | 1 | ..... | 5 | 84 | Delaware |
| 15 | 79 | 23 | 25 | 9 | 1,636 | 39 | 12 | 4 | 55 | 1,691 | Florida |
| 31 | 169 | 25 | 83 | 68 | 1,821 | 9 | 9 | 9 | 27 | 1,848 | Georgia |
| ..... | 2 | ..... | ..... | 1 | 37 | ..... | ..... | 2 | 2 | 39 | Hawaii |
| 55 | 149 | 18 | 118 | 21 | 812 | 67 | 87 | 43 | 197 | 1,009 | Idaho |
| 145 | 868 | 90 | 697 | 349 | 3,580 | 267 | 187 | 146 | 600 | 4,180 | Illinois |
| 88 | 367 | 44 | 265 | 122 | 1,807 | 126 | 100 | 63 | 289 | 2,096 | Indiana |
| 210 | 1,453 | 174 | 579 | 217 | 4,319 | 255 | 147 | 73 | 475 | 4,794 | Iowa |
| 107 | 658 | 68 | 448 | 270 | 2,353 | 222 | 202 | 91 | 515 | 2,868 | Kansas |
| 19 | 80 | 6 | 47 | 42 | 2,609 | 8 | 10 | 5 | 23 | 2,632 | Kentucky |
| 10 | 121 | 22 | 123 | 128 | 1,607 | 17 | 20 | 29 | 66 | 1,673 | Louisiana |
| 1 | 14 | ..... | 1 | ..... | 242 | 3 | ..... | ..... | 3 | 245 | Maine |
| 12 | 32 | 5 | 8 | 5 | 492 | 6 | 5 | 3 | 14 | 506 | Maryland |
| ..... | 1 | 1 | 1 | ..... | 144 | 1 | ..... | ..... | 1 | 145 | Massachusetts |
| 36 | 228 | 27 | 108 | 38 | 1,613 | 125 | 52 | 20 | 197 | 1,810 | Michigan |
| 99 | 731 | 84 | 289 | 76 | 2,793 | 235 | 144 | 100 | 479 | 3,272 | Minnesota |
| 4 | 110 | 18 | 193 | 140 | 1,563 | 34 | 18 | 19 | 71 | 1,634 | Mississippi |
| 88 | 400 | 52 | 216 | 140 | 2,531 | 100 | 60 | 49 | 209 | 2,740 | Missouri |
| 46 | 110 | 9 | 61 | 31 | 754 | 106 | 109 | 109 | 324 | 1,078 | Montana |
| 95 | 798 | 78 | 421 | 215 | 2,337 | 115 | 72 | 39 | 226 | 2,563 | Nebraska |
| 1 | 4 | 1 | 3 | 2 | 66 | 4 | 1 | ..... | 5 | 71 | Nevada |
| ..... | 2 | ..... | 1 | ..... | 158 | ..... | ..... | .... | ..... | 158 | New Hampshire |
| 4 | 11 | ..... | 8 | 2 | 249 | 1 | ..... | ..... | 1 | 250 | New Jersey |
| 8 | 47 | 2 | 33 | 14 | 286 | 1 | 10 | 3 | 14 | 300 | New Mexico |
| 30 | 129 | 11 | 32 | 12 | 1,741 | 45 | 23 | 9 | 77 | 1,818 | New York |
| 20 | 121 | 29 | 67 | 66 | 2,022 | 19 | 10 | 5 | 34 | 2,056 | North Carolina |
| 91 | 453 | 31 | 271 | 95 | 1,322 | 302 | 238 | 200 | 740 | 2,062 | North Dakota |
| 71 | 280 | 41 | 145 | 59 | 1,973 | 88 | 53 | 23 | 164 | 2,137 | Ohio |
| 53 | 361 | 21 | 159 | 72 | 1,891 | 127 | 104 | 48 | 279 | 2,170 | Oklahoma |
| 11 | 72 | 5 | 39 | 7 | 868 | 42 | 23 | 19 | 84 | 952 | Oregon |
| 35 | 112 | 4 | 18 | 6 | 1,575 | 16 | 9 | 1 | 26 | 1,601 | Pennsylvania |
| ..... | ..... | ..... | ..... | ..... | 12 | ..... | ..... | ..... | ..... | 12 | Rhode Island |
| 7 | 74 | 13 | 31 | 38 | 779 | 6 | 7 | 4 | 17 | 796 | South Carolina |
| 87 | 423 | 21 | 181 | 42 | 1,355 | 106 | 80 | 52 | 238 | 1,593 | South Dakota |
| 18 | 132 | 11 | 95 | 57 | 1,923 | 9 | 11 | 9 | 29 | 1,952 | Tennessee |
| 109 | 807 | 108 | 513 | 420 | 6,886 | 115 | 98 | 86 | 299 | 7,185 | Texas |
| 14 | 56 | 5 | 22 | 6 | 466 | 10 | 5 | 8 | 23 | 489 | Utah |
| 5 | 9 | 4 | 3 | 2 | 245 | 8 | ..... | ..... | 8 | 253 | Vermont |
| 11 | 68 | 6 | 21 | 19 | 1,455 | 12 | 2 | 1 | 15 | 1,470 | Virginia |
| 11 | 58 | 7 | 30 | 13 | 1,168 | 49 | 61 | 24 | 134 | 1,302 | Washington |
| ..... | 3 | 1 | ..... | ..... | 325 | 1 | ..... | ..... | 1 | 326 | West Virginia |
| 128 | 422 | 39 | 146 | 45 | 2,860 | 117 | 35 | 15 | 167 | 3,027 | Wisconsin |
| 7 | 31 | 4 | 19 | 5 | 224 | 28 | 11 | 5 | 44 | 268 | Wyoming |
| ..... | ..... | ..... | ..... | ..... | 98 | ..... | ..... | ..... | ..... | 98 | U.S. Government |
| ..... | 1 | ..... | 1 | ..... | 234 | ..... | ..... | ..... | ..... | 234 | Miscellaneous |
| **1,870** | **10,656** | **1,199** | **5,990** | **3,347** | **70,381** | **3,021** | **2,214** | **1,528** | **6,763** | **77,144** | **TOTAL** |

**DATA:** Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers, or contractor's off-highway types. Report includes units marketed by these firms: Allied Farm Equip. (Leyland, Satoh); Allis-Chalmers; Belarus; J I Case; Deere, Deutz; Ford; International Harvester; Long; Massey-Ferguson; Steiger; Versatile; R.M. Wade (Satoh); and White. Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

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# RETAIL SALES OF SELECTED FARM EQUIPMENT

## — Jan.-Dec. 1982(1)

## (In Units)

| | Combines S-P | Corn Heads | Hay Balers(2) | — Windrowers — Self-Propelled Power Units | Total Heads | Grinder-Mixers | Shear-Bar Forage Harvesters(3) | Mower Conditioners, All Types | Manure Spreaders Conveyor-Type |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 113 | 29 | 105 | 1 | 1 | 74 | 35 | 112 | 4 |
| Alaska | ..... | ..... | 12 | ..... | ..... | 1 | 1 | 6 | ..... |
| Arizona | 31 | 5 | 26 | 34 | 47 | 8 | 9 | 9 | 2 |
| Arkansas | 308 | 7 | 102 | ..... | ..... | 48 | 7 | 239 | 56 |
| California | 183 | 49 | 141 | 172 | 191 | 7 | 54 | 35 | 59 |
| Colorado | 228 | 114 | 332 | 159 | 170 | 34 | 61 | 106 | 41 |
| Connecticut | 1 | ..... | 39 | ..... | ..... | 1 | 34 | 73 | 65 |
| Delaware | 15 | 10 | 11 | ..... | ..... | 7 | 2 | 7 | 24 |
| Florida | 40 | 17 | 64 | 2 | 2 | 13 | 26 | 65 | 21 |
| Georgia | 383 | 122 | 146 | 1 | 2 | 129 | 53 | 157 | 25 |
| Hawaii | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| Idaho | 291 | 9 | 367 | 209 | 215 | 26 | 26 | 109 | 95 |
| Illinois | 1,714 | 1,790 | 199 | 7 | 8 | 312 | 140 | 464 | 455 |
| Indiana | 721 | 775 | 186 | 4 | 5 | 205 | 88 | 329 | 320 |
| Iowa | 1,895 | 1,904 | 231 | 82 | 102 | 749 | 278 | 689 | 1,260 |
| Kansas | 1,377 | 141 | 218 | 140 | 158 | 160 | 126 | 485 | 156 |
| Kentucky | 178 | 117 | 186 | 4 | 6 | 177 | 105 | 619 | 213 |
| Louisiana | 128 | 6 | 66 | ..... | ..... | 12 | 13 | 50 | 17 |
| Maine | 4 | 5 | 46 | 2 | 2 | 3 | 30 | 70 | 74 |
| Maryland | 75 | 85 | 73 | 9 | 10 | 34 | 53 | 97 | 144 |
| Massachusetts | ..... | 1 | 35 | ..... | ..... | 3 | 33 | 56 | 45 |
| Michigan | 263 | 273 | 230 | 29 | 28 | 151 | 208 | 384 | 477 |
| Minnesota | 1,013 | 734 | 447 | 349 | 383 | 392 | 458 | 745 | 1,186 |
| Mississippi | 236 | 8 | 73 | 1 | 1 | 39 | 36 | 60 | 20 |
| Missouri | 732 | 255 | 246 | 16 | 20 | 304 | 77 | 901 | 232 |
| Montana | 397 | 3 | 205 | 303 | 369 | 49 | 34 | 148 | 39 |
| Nebraska | 1,143 | 809 | 143 | 179 | 213 | 346 | 239 | 412 | 281 |
| Nevada | 2 | ..... | 29 | 46 | 50 | 1 | 5 | 9 | 9 |
| New Hampshire | ..... | 1 | 25 | ..... | ..... | ..... | 17 | 62 | 41 |
| New Jersey | 6 | 10 | 32 | 2 | 2 | 9 | 10 | 36 | 43 |
| New Mexico | 33 | 3 | 121 | 39 | 39 | 5 | 16 | 26 | 2 |
| New York | 90 | 97 | 519 | 37 | 38 | 84 | 440 | 727 | 1,224 |
| North Carolina | 295 | 254 | 189 | ..... | ..... | 93 | 71 | 261 | 105 |
| North Dakota | 910 | 73 | 32 | 472 | 549 | 91 | 81 | 186 | 81 |
| Ohio | 382 | 405 | 301 | 9 | 9 | 220 | 154 | 547 | 548 |
| Oklahoma | 559 | 13 | 216 | 78 | 92 | 72 | 22 | 415 | 36 |
| Oregon | 130 | 16 | 209 | 127 | 145 | 10 | 21 | 115 | 74 |
| Pennsylvania | 106 | 131 | 548 | 35 | 37 | 242 | 351 | 775 | 965 |
| Rhode Island | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 5 | 2 |
| South Carolina | 133 | 55 | 51 | ..... | ..... | 54 | 21 | 107 | 24 |
| South Dakota | 450 | 222 | 69 | 395 | 432 | 196 | 230 | 171 | 175 |
| Tennessee | 165 | 45 | 216 | ..... | ..... | 167 | 97 | 556 | 100 |
| Texas | 759 | 145 | 478 | 61 | 69 | 161 | 39 | 943 | 118 |
| Utah | 27 | 5 | 258 | 76 | 84 | 16 | 45 | 148 | 68 |
| Vermont | 3 | 3 | 69 | 4 | 4 | ..... | 81 | 129 | 175 |
| Virginia | 112 | 95 | 198 | 4 | 5 | 82 | 119 | 517 | 180 |
| Washington | 207 | 22 | 218 | 76 | 89 | 10 | 55 | 112 | 69 |
| West Virginia | 5 | 3 | 95 | 1 | 1 | 21 | 24 | 129 | 44 |
| Wisconsin | 313 | 413 | 966 | 204 | 215 | 344 | 997 | 1,523 | 1,783 |
| Wyoming | 46 | 15 | 135 | 104 | 128 | 14 | 23 | 52 | 24 |
| U.S. Government | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Miscellaneous (4) | 1 | ..... | ..... | 1 | 1 | ..... | ..... | 2 | ..... |
| TOTAL | 16,205 | 9,294 | 8,905 | 3,474 | 3,922 | 5,176 | 5.145 | 13,981 | 11,201 |

Data released Feb. 25, 1983, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

**I&T**
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## JONES FARM EQUIPMENT CO.
## Dothan, Alabama
## February 8, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| 5030 diesel, 1981 (Good) | 3950* |
| CA, 1951 (Rough) | 295 |
| CA, cult., plt., 1951 (Fair) | 460* |
| B, cult., 1953 (Rough) | 350 |
| B, 1952 (Rough) | 225 |

**CASE TRACTOR**

| | |
|---|---|
| 870 diesel, 1972 (Good) | 3950 |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 1200 diesel, 1968 (Fair) | 1900 |
| 990 diesel, 1967 (Fair) | 1400* |
| 885 diesel, 1976 (Excellent) | 4000 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1085 diesel, 1975 (Good) | 6550 |
| 275 diesel, 1976 (Good) | 6425 |
| 265 diesel, 1976 (Good) | 5700 |
| 245 diesel, 1979 (Excellent) | 6825 |
| 245 diesel, 1977 (Good) | 5200 |
| 235 diesel, 1976 (Good) | 4100* |
| 180 diesel, 1966 (Good) | 3500 |
| 175 diesel, 1970 (Fair) | 3250 |
| 175 diesel, 1966 (Good) | 2950 |
| 175 diesel, 1966 (Good) | 2800 |
| 165 diesel, 1974 (Good) | 3600* |
| 165 diesel, 1966 (Good) | 3400* |
| 165 diesel, 1966 (Fair) | 2900* |
| 165 diesel, 1966 (Good) | 3500 |
| 165 diesel, 1966 (Good) | 3300 |
| 135 diesel, 1966 (Rough) | 2000 |
| 135 diesel, 1966 (Good) | 2850 |
| 35, 1963 (Good) | 1900* |
| 35 diesel, 1963 (Excellent) | 2450 |
| 35 diesel, 1962 (Good) | 2175* |
| 35 diesel, 1962 (Good) | 1700 |
| 35, 1957 (Fair) | 1350 |
| 35, 1957 (Good) | 1650 |
| TO30, 1952 (Good) | 900 |
| TO20, 1950 (Fair) | 800 |
| TO20, 1950 (Fair) | 700 |
| TO20, 1950 (Good) | 1150* |
| TE20, 1948 (Fair) | 675 |
| TE20, 1948 (Fair) | 700 |

**FORD-FERGUSON TRACTOR**

| | |
|---|---|
| 9N, 1945 (Fair) | 675 |

**FORD TRACTORS**

| | |
|---|---|
| 8600 diesel, 1975 (Good) | 6400* |
| 5000 diesel, 1972 (Excellent) | 4700 |
| 5000 diesel, 1971 (Good) | 4000 |
| 5000 diesel, 1968 (Rough) | 1600* |
| 5000 diesel, 1966 (Rough) | 1475 |
| 4000 diesel, 1974 (Excellent) | 4650 |
| 4000 diesel, 1972 (Excellent) | 4600 |
| 4000 diesel, 1971 (Good) | 4900 |
| 4000 diesel, 1968 (Rough) | 2300* |
| 4000 diesel, 1967 (Fair) | 3300* |
| 4000 diesel, 1965 (Rough) | 2325 |
| 3000 diesel, 1978 (Fair) | 3300 |
| 3000 diesel, 1969 (Fair) | 3100* |
| 3000 diesel, 1968 (Excellent) | 3650 |
| 3000 diesel, 1967 (Rough) | 1400 |
| 3000 diesel, 1966 (Good) | 2900 |
| 2000, 1964 (Excellent) | 2800 |
| 850, 1956 (Fair) | 1325* |
| 850, 1956 (Excellent) | 2400* |
| 841, 1958 (Rough) | 825 |
| 841 diesel, 1958 (Fair) | 1350 |
| 660, 1957 (Excellent) | 2800 |
| 650, 1955 (Good) | 1725 |
| Major diesel, 1956 (Rough) | 350 |
| Major diesel, 1956 (Rough) | 435 |
| Major diesel, 1954 (Rough) | 425 |
| NAA, 1954 (Fair) | 1300 |
| NAA, 1954 (Good) | 1650 |
| Jub., 1953 (Good) | 1500* |
| Jub., 1953 (Fair) | 1375 |
| Dexta, 1958 (Fair) | 1250* |
| Dexta, 1958 (Fair) | 1350 |
| Dexta, 1958 (Good) | 1550* |
| Dexta, 1958 (Fair) | 950 |
| 8N, 1952 (Excellent) | 1900* |
| 8N, 1952 (Excellent) | 2000* |
| 8N, 1951 (Good) | 1550 |
| 8N, 1951 (Good) | 1400 |
| 8N, 1948 (Excellent) | 1950 |
| 8N, 1948 (Good) | 1450 |
| 8N, 1948 (Good) | 1375* |
| 8N, 1948 (Excellent) | 2000* |
| 8N, 1948 (Rough) | 500 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| 766 diesel, 1974 (Fair) | 4200 |
| 634 diesel, (Rough) | 1100 |
| 424 diesel, 1967 (Good) | 1800 |
| 424 diesel, 1966 (Good) | 1550 |
| B414 diesel, 1964 (Excellent) | 1985 |
| B414 diesel 1963 (Good) | 1650 |
| 3800 diesel, ldr., backhoe, 1968 (Excellent) | 5500 |
| Sup., C, cult., 1953 (Good) | 800* |
| 140, cult., 1970 (Excellent) | 2400 |
| A, cult., 1944 (Good) | 400 |
| Cub, Loboy, mo., 1964 (Excellent) | 1875 |
| Cub, 1948 (Fair) | 590 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 5020 diesel, 1966 (Rough) | 1500 |
| 4430 diesel, 1976 (Good) | 12,500 |
| 4320 diesel, 1971 (Good) | 6500* |
| 4030 diesel, 1976 (Good) | 7400* |
| 4030 diesel, 1974 (Good) | 7700* |
| 4030 diesel, 1974 (Fair) | 6500* |
| 4020 diesel, 1970 (Fair) | 5100* |
| 4020 diesel, 1966 (Rough) | 1950 |
| 2840 diesel, 1978 (Good) | 8000 |
| 2630 diesel, 1974 (Good) | 5100* |
| 2030 diesel, 1972 (Good) | 4900* |
| 2010, ldr., 1962 (Fair) | 1400 |
| 2010 diesel, 1962 (Fair) | 1000 |
| 1520 diesel, 1972 (Excellent) | 4400* |
| 1520 diesel, 1972 (Excellent) | 4500* |
| 1520 diesel, 1971 (Good) | 3800 |
| 1020 diesel, 1970 (Good) | 3800* |
| 830 diesel, 1974 (Good) | 4100* |
| 420, LP, 1958 (Good) | 1200 |
| 420, 1957 (Rough) | 250 |
| 301 diesel, 1975 (Excellent) | 4200 |
| 70 diesel, 1954 (Fair) | 525 |
| 40, 1954 (Good) | 950 |
| A, 1951 (Fair) | 400* |
| A, LP, 1943 (Rough) | 175 |
| LA, 1944 (Fair) | 250 |

**OLIVER TRACTOR**

| | |
|---|---|
| 60, mo., (Fair) | 200 |

## ENLOW AUCTION CO.
## Tulsa, Oklahoma
## February 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| D-14, mo. 1960 (Good) | 2150 |
| D-19 diesel, 1959 (Good) | 2150 |
| 5020, 1978 (Excellent) | 4200 |

**CASE TRACTORS**

| | |
|---|---|
| 930 diesel, 1963 (Fair) | 2900* |
| 580 diesel, ldr., 1970 (Good) | 5800 |
| 1370 diesel, cab, 1975 (Good) | 7800 |

**DAVID BROWN TRACTOR**

| | |
|---|---|
| 990, 1968 (Good) | 2800 |

**FORD TRACTORS**

| | |
|---|---|
| 9N, 1943 (Fair) | 800* |
| 9N, 1943 (Good) | 1250 |
| 9N, 1944 (Rough) | 650* |
| 9N, 1945 (Good) | 1300 |
| 9N, 1946 (Good) | 1200* |
| 9N, 1946 (Fair) | 900* |
| 9N, 1946 (Good) | 1100 |
| 8N, 1947 (Fair) | 1000* |
| 8N, 1947 (Good) | 1475 |
| 8N, 1948 (Good) | 1300 |
| 8N, 1948 (Good) | 1575 |
| 8N, 1949 (Good) | 1500 |
| 8N, 1949 (Fair) | 1125 |
| 8N, 1949 (Good) | 1300 |
| 8N, 1949 (Good) | 1600 |
| 8N, 1950 (Good) | 1350 |
| 8N, 1951 (Good) | 1300 |
| 8N, 1952 (Good) | 1750 |
| 8N, 1952 (Good) | 1550 |
| 8N, 1952 (Good) | 1500 |
| NAA, 1953 (Fair) | 1650 |
| NAA, 1953 (Good) | 2275 |
| NAA, ldr., 1953 (Good) | 2400 |
| NAA, ldr., 1953 (Good) | 2500 |
| NAA, 1953 (Good) | 2300 |
| 640, 1955 (Fair) | 1600 |
| 640, 1956 (Good) | 2150 |
| 641, 1958 (Fair) | 1700* |
| 641, 1958 (Good) | 2400 |
| 641, 1960 (Good) | 2250* |
| 641, 1960 (Good) | 2450 |
| 850, 1956 (Good) | 2550 |
| 801, 1959 (Good) | 2600 |
| 801, 1960 (Fair) | 1950 |
| 841, 1960 (Good) | 2575 |
| Mjr. diesel, 1957 (Rough) | 625 |
| 2000, 1964 (Good) | 2575 |
| 2000, 1964 (Good) | 2300 |
| 3000, 1966 (Good) | 3000 |
| 3600 diesel, 1978 (Good) | 6350* |
| 8000 diesel, 1969 (Fair) | 3700 |
| 9600 diesel, 1975 (Fair) | 5600* |

**FERGUSON TRACTORS**

| | |
|---|---|
| 20, 1948 (Fair) | 1050 |
| 20, 1948 (Fair) | 1000 |
| 20, 1951 (Good) | 1425 |
| 30, 1952 (Rough) | 750 |

**OLIVER TRACTOR**

| | |
|---|---|
| 55, ldr., 1955 (Fair) | 1525 |

(More...)

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## Auctions *(continued)*

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Cub Loboy, 1957 (Good) | 1700 |
| Cub Loboy, 1961 (Good) | 2250* |
| 154 Cub, 1969 (Good) | 2150* |
| A, 1945 (Good) | 675 |
| A, mo., 1947 (Good) | 1000 |
| Super A, 1952 (Fair) | 800* |
| Super A, 1954 (Good) | 1000* |
| 300, 1955 (Good) | 1600 |
| 340, 1960 (Good) | 1650 |
| 340 diesel, 1961 (Good) | 2450 |
| 460, ldr., 1959 (Fair) | 1800* |
| 2400 A, ldr., 1969 (Good) | 4200 |
| 624 diesel, 1968 (Good) | 2800 |
| 544, ldr., 1972 (Good) | 4100 |
| 606, 1966 (Fair) | 3100 |
| 706, 1963 (Rough) | 2000 |
| 2606, 1965 (Good) | 2650 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| MT, 1950 (Good) | 675 |
| MT, mo., 1951 (Good) | 925 |
| 50, 1954 (Good) | 1450* |
| 70, 1953 (Fair) | 1350 |
| 430, 1958 (Good) | 1800* |
| 1010, 1963 (Good) | 1900* |
| 850 diesel, 1978 (Good) | 4900* |
| 1530 diesel, 1975 (Good) | 4800* |
| 2020, 1971 (Fair) | 3600 |
| 4020 diesel, 1969 (Good) | 5000* |

**LONG TRACTOR**

| | |
|---|---|
| 460 diesel, 1980 (Salvage) | 2500 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 35 diesel, 4-cyl. 1960 (Fair) | 1100* |
| 35, 1961 (Good) | 2300 |
| 35, 1961 (Good) | 2150 |
| 35, 1963 (Good) | 2300 |
| 35 diesel, 1963 (Good) | 2500 |
| 50, 1963 (Good) | 2900 |
| 65 diesel, 1959 (Good) | 2500* |
| 65, 1961 (Good) | 2250 |
| 65, 1961 (Fair) | 1750* |
| 65 diesel, 1962 (Good) | 2700* |
| 135, 1966 (Good) | 2725* |
| 135, 1970 (Good) | 3300 |
| 135, ldr., 1970 (Good) | 3800 |
| 135, 1971 (Good) | 3400 |
| 165 diesel, 1966 (Fair) | 2850* |
| 165 diesel, 1967 (Good) | 3300* |
| 165 diesel, 1969 (Good) | 4050 |
| 165 diesel, 1969 (Fair) | 3150* |
| 180 diesel, 1966 (Good) | 3200* |
| 180, 1967 (Good) | 2500 |
| 230 diesel, 1977 (Good) | 6000 |
| 275 diesel, 1976 (Good) | 6200* |
| 285 diesel, 1981 (Excellent) | 13,200* |
| 1100 diesel, 1967 (Fair) | 4050* |
| 1100 diesel, 1968 (Good) | 4700 |
| 1105 diesel, 1976 (Good) | 7800* |
| 40, ldr., 1969 (Good) | 5800 |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| Jet Star, 1959 (Fair) | 925 |
| Jet Star 3, 1967 (Good) | 1850 |
| U-302 diesel, cab, 1968 (Good) | 3700 |
| M-670 diesel, 1970 (Good) | 4000 |
| G-900 diesel, 1967 (Good) | 2600 |

### YODER & FREY, INC.
### Archbold, Ohio
### February 7 & 8, 1983

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Sup. A, cult., | 1450 |
| M, 1949 (Fair) | 775 |
| M, 1950 (Good) | 800* |
| Sup. M, 1952 (Rough) | 925 |
| 300, 1958 (Fair) | 825* |
| 300, 1963 (Fair) | 735 |
| 300, 1964 (Good) | 725 |
| 340, mo., 1963 (Fair) | 1200* |
| 400 diesel, 1963 (Fair) | 625* |
| 400, 1956 (Fair) | 825 |
| 450 diesel, 1957 (Rough) | 750* |
| 460 utility, 1960 (Rough) | 1200* |
| 460, 1960 (Fair) | 1400 |
| 464, (Rough) | 2250* |
| 656 diesel, 1970 (Good) | 4075 |
| 656, 1971 (Rough) | 2650 |
| 674, 1975 (Good) | 4250* |
| 706, 1964 (Fair) | 2475 |
| 706, 1964 (Fair) | 2200 |
| 706 diesel, 1964 (Rough) | 1725 |
| 706, 1966 (Fair) | 1900* |
| 706, 1963 (Fair) | 2200* |
| 756, 1970 (Fair) | 4400* |
| 756 diesel, 1968 (Good) | 5800* |
| 766 diesel, 1973 (Fair) | 7250* |
| 766, 1975 (Good) | 4450* |
| 766, 1976 (Fair) | 4650* |
| 806, 1966 (Good) | 2350* |
| 806, 1965 (Good) | 3500* |
| 806, 1965 (Good) | 2800 |
| 806, 1965 (Good) | 2850* |
| 806 diesel, 1964 (Fair) | 3850 |
| 806 diesel, 1966 (Good) | 4650* |
| 856 diesel, 1967 (Good) | 6800* |
| 856 diesel, 1967 (Good) | 6500* |
| 966 cab, 1977 (Good) | 9000 |
| 1066, cab, 1976 (Good) | 9300* |
| 1066 diesel, 1974 (Good) | 8150* |
| 1206 diesel, cab, 1968 (Good) | 5600* |
| 1206 diesel, cab, 1963 (Fair) | 4800* |
| 1256 diesel, 1970 (Good) | 5225* |
| 1456 diesel, 1969 (Fair) | 7000 |
| 1466, cab, 1976 (Good) | 8400 |
| 1466, cab, 1975 (Good) | 8500 |
| 1466 diesel, 1973 (Fair) | 7500* |
| 1466 diesel, 1971 (Good) | 7000 |
| 1468, cab, 1972 (Good) | 4925 |
| 1486, cab, 1978 (Good) | 14,000* |
| 1486, cab, 1979 (Good) | 16,500* |
| 1486, cab, 1976 (Good) | 15,800* |
| 1566, cab, 1980 (Excellent) | 17,500* |
| 1586, cab, 1977 (Rough) | 12,000* |
| 3588 diesel, 1978 (Good) | 18,000* |
| 3788 diesel, 1981 (Excellent) | 26,000* |

**OLIVER TRACTORS**

| | |
|---|---|
| 77, 1952 (Rough) | 625 |
| 1650 diesel, 1965 (Fair) | 3500 |
| 1650 diesel, 1968 (Fair) | 3400* |
| 1755, cab, 1972 (Fair) | 5300* |
| 1850, 1966 (Fair) | 2500 |
| 1855 diesel, 1972 (Fair) | 4600* |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| G, 1945 (Rough) | 525* |
| M, 1949 (Fair) | 775* |
| 40, 1954 (Fair) | 775* |
| 40, 1955 (Fair) | 950* |
| 70, 1955 (Fair) | 925* |
| 720 diesel, 1956 (Fair) | 1100* |
| 720 diesel, 1957 (Fair) | 1050* |
| 820 diesel, 1957 (Fair) | 1700* |
| 830 diesel, 1959 (Fair) | 1900* |
| 2020 diesel, 1970 (Fair) | 3700* |
| 2630 diesel, 1975 (Fair) | 6100 |
| 3020, 1967 (Fair) | 3150* |
| 4010 diesel, 1964 (Fair) | 4000 |
| 4010 diesel, 1962 (Fair) | 4700* |
| 4010 diesel, 1963 (Good) | 3900* |
| 4010 diesel, 1963 (Fair) | 4500* |
| 4010 diesel, 1963 (Good) | 4400* |
| 4020 diesel, 1965 (Fair) | 4600 |
| 4020 diesel, 1968 (Good) | 5350 |
| 4020 diesel, 1966 (Good) | 6150* |
| 4020 diesel, cab, 1969 (Good) | 8900* |
| 4020 diesel, 1969 (Fair) | 5500 |
| 4020 diesel, 1966 (Good) | 5800* |
| 4020 diesel, 1970 (Good) | 7700* |
| 4020 diesel, 1968 (Fair) | 5350 |
| 4020 diesel, 1965 (Fair) | 5050 |
| 4020 diesel, 1965 (Good) | 5200 |
| 4320, cab, 1972 (Good) | 8400* |
| 4430, cab, 1977 (Good) | 12,250* |
| 4430, cab, 1977 (Good) | 11,750* |
| 4430, cab, 1976 (Good) | 12,400 |
| 4630 diesel, 1977 (Good) | 15,700* |
| 5010 diesel, 1965 (Fair) | 3600 |
| 5020, cab, 1969 (Fair) | 4400* |
| 3120 diesel, 1972 (Good) | 3800 |

| | |
|---|---|
| 2130 diesel, 1974 (Fair) | 3700 |

**DAVID BROWN TRACTOR**

| | |
|---|---|
| 880, (Fair) | 1500* |

**CASE TRACTORS**

| | |
|---|---|
| SC, 1945 (Fair) | 375* |
| DC, 1944 (Fair) | 800 |
| 580B, ldr., | 3250 |
| 580B, ldr., (Fair) | 3700* |
| 930, | 1850 |
| 930 diesel, cab, 1965 (Fair) | 1700* |
| 930, 1967 (Good) | 2500* |
| 930, 1967 (Fair) | 2500* |
| 930 diesel, cab, 1968 (Fair) | 2600 |
| 1030 diesel, 1966 (Fair) | 2200 |
| 1030 diesel, 1967 (Fair) | 2975 |
| 2470, (Fair) | 12,500* |

**BELARUS TRACTOR**

| | |
|---|---|
| 500 diesel, (Fair) | 1525 |

**LONG TRACTOR**

| | |
|---|---|
| 9500 diesel, 1975 (Good) | 3350* |

**FERGUSON & MASSEY FERGUSON TRACTORS**

| | |
|---|---|
| TK-20, 1945 (Rough) | 500* |
| 65, 1962 (Rough) | 1175* |
| 65, 1961 (Good) | 1850 |
| 135 diesel, 1970 (Fair) | 3350 |
| 150 diesel, 1972 (Fair) | 2950* |
| 165 diesel, 1971 (Fair) | 3375 |
| 165, 1969 (Fair) | 2950* |
| 175, 1967 (Rough) | 2350 |
| 1085 diesel, ldr., 1977 (Good) | 7000* |
| 1085 diesel, 1976 (Fair) | 5300* |
| 1100 diesel, 1965 (Fair) | 3650 |
| 1130 diesel, cab, 1970 (Good) | 5200 |
| 1130 diesel, 1967 (Rough) | 4600* |
| 1135 diesel, cab, 1978 (Good) | 8000 |
| 1155 diesel, 1978 (Good) | 9500* |
| 1800 diesel, 1974 (Fair) | 7000* |
| 1805 diesel, 1977 (Rough) | 8250* |
| 2805, cab, 1976 (Good) | 16,000* |

**FORD TRACTORS**

| | |
|---|---|
| 8N, 1952 (Rough) | 925 |
| 8N, 1952 (Fair) | 1400 |
| 8N, 1950 (Good) | 1275 |
| 8N, 1949 (Fair) | 1150 |
| 8N, 1950 (Fair) | 1275 |
| 8N, 1952 (Rough) | 1250 |
| 8N, 1950 (Rough) | 950* |
| 9N, 1940 (Rough) | 550 |
| Jub. ldr., 1953 (Good) | 1975 |
| 900, 1955 (Good) | 1750* |
| 2000, ldr., 1959 (Fair) | 1800* |
| 3000, 1971 (Fair) | 3400 |
| 3000, 1971 (Good) | 3800 |
| 3400, ldr., 1973 (Fair) | 3600 |
| 5000 diesel, 1973 (Good) | 4700* |
| 5000 diesel, cab, 1975 (Good) | 6150 |
| 7000 diesel, cab, 1973 (Rough) | 4150 |
| 8000 diesel, 1971 (Fair) | 3775 |
| 8000, cab, 1971 (Rough) | 6250* |
| 9600, cab, 1975 (Fair) | 7800* |
| 1700 diesel, 1981 (Good) | 3050 |

**MASSEY-HARRIS TRACTORS**

| | |
|---|---|
| 44, 1950 (Rough) | 400 |
| Pony, 1950 (Fair) | 700* |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| G-1000 diesel, 1964 (Rough) | 1800 |
| G-1000 diesel, Vista. (Fair) | 2800* |
| UB, 1947 (Rough) | 450 |
| ZB, 1946 (Rough) | 450* |

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| CA, ldr., plow, 1948 (Fair) | 610 |
| WD, 1947 (Fair) | 400* |
| WD, 1950 (Fair) | 675 |
| WD, 1949 (Rough) | 425 |
| WD, 1950 (Rough) | 525 |
| WD, plow, 1946 (Rough) | 500 |
| WD-45, 1950 (Fair) | 635 |
| D-15, 1965 (Rough) | 1000* |
| D-17, 1964 (Rough) | 1400* |
| D-17, 1965 (Rough) | 975* |
| D-19, ldr., 1966 (Rough) | 1500* |
| D-19, 1966 (Fair) | 2025 |
| 190 diesel, cab, (Fair) | 2900* |
| 190XT diesel, 1972 (Fair) | 3600 |
| 200, cab, 1973 (Good) | 7700 |
| 210 diesel, 1974 (Good) | 6100* |
| 5020 diesel, 1982 (Excellent) | 3800* |
| 440, cab, (Fair) | 9250* |
| 7030, cab, 1974 (Good) | 7350 |

**WHITE TRACTORS**

| | |
|---|---|
| 2-105 diesel, cab, (Good) | 11,000* |
| 2-150 diesel, cab, (Fair) | 8750* |

**COCKSHUTT TRACTOR**

| | |
|---|---|
| 30, 1945 (Rough) | 300* |

---

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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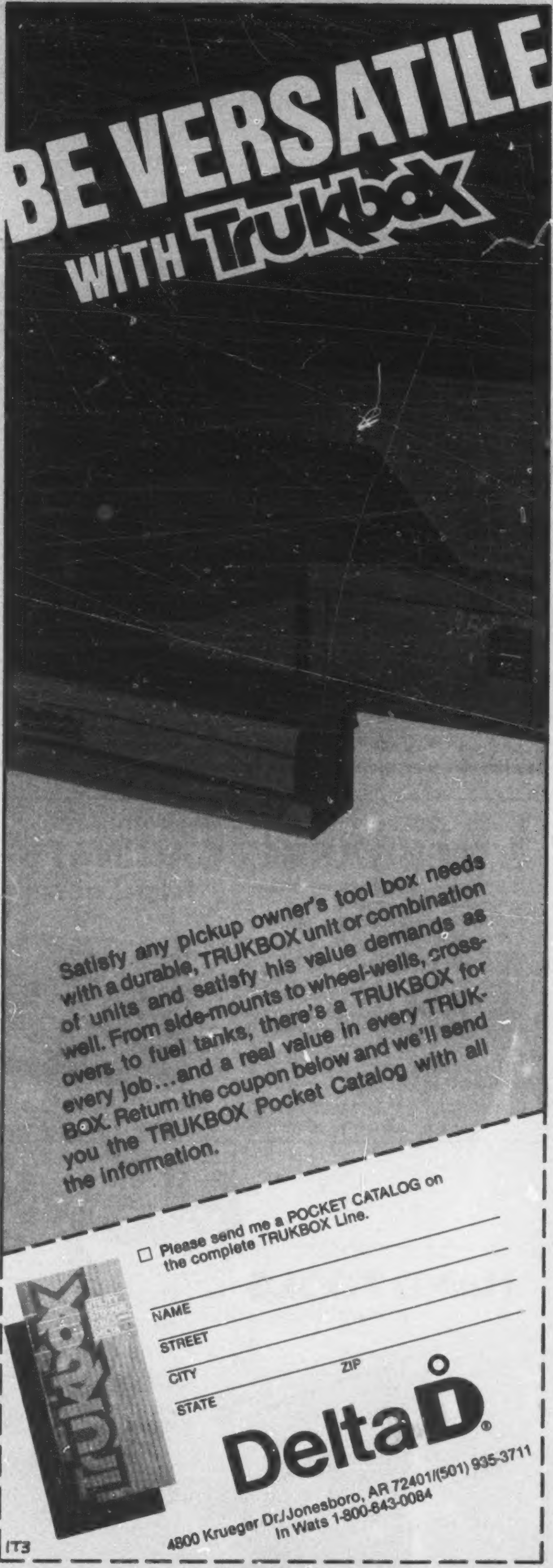

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May 1983
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## Bill Dittamore's mix-and-match parts operation page 20

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# Implement & Tractor

*The business magazine of the farm & industrial equipment industry*

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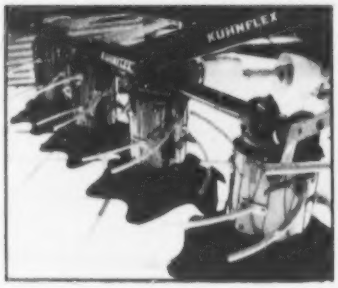
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**8:** **Service Managers: They Like Their Work, But Want to Learn More.** Recognition, more involvement and better compensation would be welcome too, according to a university study.

**12:** **Scouting Out SIMA.** Report from the world's biggest farm equipment show, showcase for the best of European machinery.

**18:** **Finding the Right Computer.** With new features that allow expansion and flexibility, modern data processing systems let a dealer start small and grow, or revive an outmoded system he already owns. Second in a series by W. David Shoup.

**20:** **Mixing and Matching: It's Building Parts Volume at Dittamore's.** This Illinois dealership learned which of its wholegoods parts fit other brands of equipment. The plan is building traffic, taking care of customers' needs – and growing.

**22:** **What Makes Farmers Buy?** Not all farmers are the same when it comes to making big purchases, reports a Kansas State University study.

**On the cover...** A look at Dittamore's growing mix-and-match parts department.

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# I&T Update

## U.S. and Canadian Unit Retail Sales

| Farm Wheel Tractors | March 1983 | March 1982 | March Pct. Change | January-March 1983 | January-March 1982 | January-March Pct. Change |
|---|---|---|---|---|---|---|
| Two-wheel drive | | | | | | |
| Under 40 HP | 4,606 | 4,132 | 11.4 | 8,930 | 8,709 | 2.5 |
| 40 to 99 HP | 3,213 | 3,982 | (19.3) | 8,295 | 9,895 | (16.2) |
| Canada 40-99 | 499 | 605 | (17.5) | 1,275 | 1,619 | (21.2) |
| 100 to 140 HP | 1,181 | 1,896 | (37.7) | 3,610 | 5,854 | (38.3) |
| 140 HP and over | 864 | 1,061 | (18.6) | 2,326 | 3,099 | (24.9) |
| Canada over 100 | 457 | 600 | (23.8) | 1,083 | 1,454 | (25.5) |
| Four-wheel drive | | | | | | |
| Under 200 HP | 145 | 393 | (63.1) | 405 | 1,010 | (59.9) |
| Over 200 HP | 244 | 304 | (19.7) | 568 | 917 | (38.1) |
| Canada | 230 | 326 | (29.4) | 508 | 725 | (30.3) |
| **Total U.S.** | **10,253** | **11,770** | **(12.9)** | **24,134** | **29,484** | **(18.2)** |
| **Total Canada*** | **1,186** | **1,531** | **(22.5)** | **2,866** | **3,798** | **(24.5)** |
| S-P Combines | 602 | 486 | 23.9 | 3,105 | 2,370 | 31.0 |
| Canada | 93 | 121 | (23.1) | 279 | 354 | (21.1) |
| Pull Combines (Can.) | 31 | 24 | 29.1 | 167 | 83 | 101.2 |
| Mower-Conditioners | 803 | 556 | 44.4 | 1,773 | 1,563 | 13.4 |
| Canada | 130 | 61 | 113.1 | 281 | 181 | 55.2 |
| Forage Harvesters** | 161 | 167 | (3.6) | 479 | 615 | (22.1) |
| Canada | 49 | 32 | 53.1 | 110 | 83 | 32.5 |
| Balers (200-lb bales) | 521 | 318 | 63.8 | 1,236 | 916 | 34.9 |
| Canada | 110 | 54 | 103.7 | 274 | 178 | 53.9 |
| Large Balers (Canada) | 157 | 54 | 190.7 | 303 | 177 | 71.7 |
| Swathers (Canada) | | | | | | |
| Pull-Type | 34 | 51 | (33.3) | 134 | 185 | (27.5) |
| Self-Propelled | 81 | 70 | 15.7 | 223 | 242 | (7.8) |

*Canada: 40 HP and over. **Shear-bar type.

Sources: Farm & Industrial Equipment Institute (312) 321-1470; Canadian Farm & Industrial Equipment Institute (416) 632-8483.

## Industry Numbers: Any PIK Impact Yet?

Retail sales data for North America show a contrasting picture. Combine sales are up (except in Canada) and tractor sales are down (except for Japanese imports). The combine activity is attributed by several watchers to intense dumping of excess inventory. But big tractor inventories are high, too. The jump in hay tools is attributed to alternate use for PIK-idled land, but Canada's hay tool sales have jumped, and there's no PIK there. Dealers I&T has talked to say they and their farmers are the most optimistic they've been in years, but apart from combines, the big stuff isn't moving yet (as of mid-April).

## Ag Engineers' Summer Meeting at Montana State U.

The American Society of Agricultural Engineers conducts two national meetings yearly. The Winter Meeting is held in downtown Chicago in December. The Summer Meeting is held at a different land-grant agricultural school every June, and this time it's Montana State U. at Bozeman.

The gathering is structured around three days of working sessions at which papers are presented. I&T counts 76 sessions this year at which 531 papers are scheduled to be read. Other events include general sessions with featured speakers, a "micro-mini tractor pull," and a Big Sky Barbecue. There's more information available from ASAE at 616/429-0300.

## FEMA Sampling: Orders, Expectations Are Up

The Farm Equipment Manufacturers Assn., surveying a sampling of its members who have reported over the past three years, announces that as of March 1, orders were up a median of 8 per cent over a year earlier. This was the first increase recorded in three years.

Thirty per cent of reporting manufacturers said they believe a pickup has already begun and another 60 per cent anticipate the pickup will begin before November. Twenty-four per cent have increased work forces since last November. Thirty-five per cent experienced "a considerable pickup" in sales during January and February.

## Farm Equipment Leasing: $4.5 Billion by 1985?

Predicasts, a business information and research firm, has taken a look at farm equipment leasing in *Capital Equipment Leasing Markets* (study 292, priced at $1,095) and pronounced it one of the fastest growing market segments. For one reason, U.S. agriculture is "locked in an unavoidable need to acquire capital equipment at a more rapid rate than earnings and credit can support."

Predicasts says that farm equipment leases went up an average of 18 per cent a year from $240 million in 1967 to $2.6 billion in 1981 and should move to $4.5 billion in 1985 and $10 billion in 1990....all capital leases, no operating leases. Predicasts says there were $4 billion of farm equipment leases in place in 1977, $10.07 billion by 1981 and that there will be $16.7 billion in place in 1985 and $32.5 billion by 1990.

How about rentals? Predicasts says that almost $600 million of rental equipment was provided in 1981, about $20 million by cooperatives, the rest by dealers.

(Predicasts is located at 11001 Cedar Ave., Cleveland, Ohio 44106.)

## Profiling the Service Manager

### Age

| | |
|---|---|
| Youngest | 20 years |
| Oldest | 70 years |
| Average | 38.9 years |

### Years In Current Position

| | |
|---|---|
| Shortest | 4 months |
| Longest | 35 years |
| Average | 7.25 years |

### Education

| | |
|---|---|
| College graduate | 22 per cent |
| Some college | 32 per cent |
| High school graduate | 35 per cent |
| Some high school | 11 per cent |

### Salary

| | |
|---|---|
| $15-19,999 | 45 per cent |
| $20-24,999 | 41 per cent |
| $25-29,999 | 8 per cent |
| $30-34,999 | 5 per cent |
| Over $35,000 | 1 per cent |

### Annual Bonus

| | |
|---|---|
| None | 29 per cent |
| Less than $1,000 | 45 per cent |
| $1,000-1,999 | 10 per cent |
| $2,000-2,999 | 9 per cent |
| Over $3,000 | 9 per cent |

### Weekly Work Schedule

| | |
|---|---|
| 40-45 Hours | 43 per cent |
| 46-50 Hours | 43 per cent |
| 51-55 Hours | 8 per cent |
| 56-60 Hours | 6 per cent |
| Over 60 Hours | 0 per cent |

### Number of Persons Supervised

| | |
|---|---|
| Lowest | 1 person |
| Highest | 17 persons |
| Average | 5.6 persons |

### Estimated Annual Shop Sales

| | |
|---|---|
| Lowest | $ 50,000 |
| Highest | $1,000,000 |
| Average | $ 212,600 |

# Service managers: They like their work, but want to learn more

**Recognition, more involvement and better compensation would be welcome, too, according to a university study.**

**By Richard A. Edwards**

The author is an agribusiness economist at Texas A&M U. This report stems from a survey of 76 farm equipment dealerships' service managers.

■WILL A PAT on the back and a $5 raise provide enough encouragement and reward to satisfy the farm equipment dealership's service manager?

Not too many years ago, that might have been enough. But it's a different, more complex society today. It takes plenty of knowledge to oversee the repair of today's complicated mechanical and electronic systems. And there

*(More...)*

### Service Managers: What They Like *Most* About Their Jobs

| Area | Importance Factor |
|---|---|
| Challenge | 41 per cent |
| Dealing with customers | 39 per cent |
| Freedom to operate the shop | 38 per cent |
| Company reputation | 28 per cent |
| Trust of the company | 28 per cent |
| Job security | 27 per cent |
| Responsibility | 18 per cent |
| Treatment by supervisor | 16 per cent |
| Company interest in personnel | 15 per cent |
| Dealing with employees | 14 per cent |
| Leadership | 11 per cent |
| Work schedule | 11 per cent |
| Salary | 8 per cent |
| Benefits package | 5 per cent |
| Authority | 4 per cent |
| Planning | 3 per cent |
| Bonus system | 1 per cent |

### Service Managers' Jobs: What Do They Like Least?

| Area | Importance Factor |
|---|---|
| Bonus system | 32 per cent |
| Dealing with employees | 28 per cent |
| Planning | 28 per cent |
| Work schedule | 27 per cent |
| Benefits package | 24 per cent |
| Authority | 22 per cent |
| Dealing with customers | 16 per cent |
| Salary | 15 per cent |
| Responsibility | 12 per cent |
| Company interest in personnel | 11 per cent |
| Job security | 9 per cent |
| Leadership | 9 per cent |
| Challenge | 8 per cent |
| Treatment by supervisor | 7 per cent |
| Freedom to operate the shop | 7 per cent |
| Company reputation | 3 per cent |
| Trust of the company | 0 per cent |

### Service Managers Rate Their Responsibilities

| Responsibility | Importance Factor |
|---|---|
| Customer relations | 79 per cent |
| Maintaining a high service level | 69 per cent |
| Shop productivity | 63 per cent |
| Controlling expenses | 47 per cent |
| Returning a net profit | 44 per cent |
| Correct pricing of tickets | 37 per cent |
| Planning & scheduling | 35 per cent |
| Employee morale | 33 per cent |
| Employee training | 33 per cent |
| Hiring qualified employees | 23 per cent |
| Keeping equipment in good repair | 15 per cent |
| Shop cleanliness | 15 per cent |
| Shop-parts relationship | 9 per cent |

### Managers Rate Personal Pros & Cons

**Five Most Positive Ratings**

| Rank | Statement |
|---|---|
| 1 | The company has a good reputation in the community |
| 2 | The company has a good reputation for customer service |
| 3 | Management is committed to having a profitable shop |
| 4 | I understand how well I am expected to do my job |
| 5 | I understand my duties and responsibilities |

**Five Most Negative Ratings**

| Rank | Statement |
|---|---|
| 1 | I have opportunity for promotion |
| 2 | My initial training for this job was adequate |
| 3 | I receive recognition for a job well done |
| 4 | I am fully informed about the company goals & objectives |
| 5 | I have respect and confidence in manufacturer's representatives |

## Service Managers *(continued)*

### Service Managers Want to Learn More

**In Which of the Following Basic Skills Do You Need Most Improvement?**

| | |
|---|---|
| Speaking skills | 37 per cent |
| Business math | 34 per cent |
| Reading | 14 per cent |
| Writing | 13 per cent |

**In Which of These Technical Areas Do You Feel Your Skills are Most Inadequate?**

| | |
|---|---|
| Computer systems | 60 per cent |
| Accounting | 45 per cent |
| Reading & understanding financial statements | 42 per cent |
| Advertising & promotion | 32 per cent |
| Motivating others | 27 per cent |
| Technical skills needed to run my shop | 21 per cent |
| Training employees | 18 per cent |
| Planning & organizing the shop's work | 18 per cent |
| Supervising employees | 14 per cent |
| Employee relations | 11 per cent |
| Customer relations | 8 per cent |

have been substantial changes in what is expected in dealing with other people.

Despite these apparent changes, results of a recent survey, taken among farm equipment service managers in Texas, Oklahoma and New Mexico, suggest that these managers still crave many of the rewards of their earlier counterparts. They want recognition for a job well done. They want proper training for the job. They have a willingness and a desire to be included as part of the dealership's management team. And they also indicate a strong desire for a better compensation package.

### Likes, dislikes

Today's manager, when asked to respond to the *likes* and *dislikes* about his job, clearly indicates displeasure with the total compensation picture. In the top five items *liked least* about their job, managers placed three items dealing with compensation: *bonus system, work schedule* and *benefits package.*

While the long hours aspect of the job has improved over the years, the distaste most likely is because of its contrast with national trends of working fewer hours for the same or improved compensation.

The other two items, which are apparently quite distasteful to the managers, are dealing with employees and planning. Those are two of the most important aspects of a manager's role, yet, about one in three managers indicated that this portion of the job was unattractive.

On the positive side—the *likes*—the most apparent was the manager's attitude toward his working environment. When asked about the most gratifying elements in his job, managers mentioned *challenge, dealing with customers, freedom to operate the shop, trust of the company, company reputation* and *job security* most often. Except for the customer relations element, the rest of those mentioned are exclusively items describing the work environment.

Thus, based on the lists of likes and dislikes, it appears that most managers feel they are allowed to operate their service departments in an at-

*(Continued on page 23)*

# What makes farmers buy?

**Not all farmers are the same when it comes to making big purchases, reports a Kansas State University study.**

■ARE YOU ready for this, Mr. Dealer? Can your ego stand a little bruising?

A group from Kansas State U. wanted to learn who was most important to farmers when they made big-ticket purchases of implements and tractors.

Survey workers, directed by Dr. Wayne Norvell of the KSU marketing department, asked 61 dealers to rank the social and business contacts that influence farmers to buy, and 35 of the dealers (57 per cent) gave *themselves* top billing.

And how did farmers answer the same question? Of 207 farmers surveyed, only 47 (23 per cent) said the dealer was the most important.

**Family counts**

"The spouse and other family members are the two most important influences," Norvell concludes, noting that 128 of the farmers (62 per cent) said they paid most attention to their kin.

The survey, completed in 1979, used a randomly-selected sample of farmers and dealers from across Kansas. Norvell said he believes the results give a reasonable picture of how farmers in general make purchase decisions, although the survey results cannot properly be statistically projected across the U.S.

The survey, he said, is notable because it looks at how factors like age, years of farming, farm size and level of education affect the thinking of farmers.

**Service makes sales**

For example, Norvell found that all categories of farmers "rank service as the most important characteristic for dealers to have," with dealer reliability and trade-in policy also ranking strongly.

That unity breaks down, though, when the farmers are separated into age and experience groups. Farmers under age 30 and those with less than five years' experience are most likely to ask opinions of neighbors and friends and take account of perceived product quality. These young farmers also want more product information from dealers than do other groups.

The image of the self-reliant farmer comes through in the results, with almost 90 per cent rating past experience as the single biggest buying influence.

Yet a host of other factors show up to influence purchases: family tradition gets stronger as the farmer gets older; product warranty meant nothing to farmers with a college degree; farmers holding more than 900 acres listened more to their dealer and less to their spouse than farmers with smaller holdings.

**Free copies**

"It is our intention to help the dealer recognize the major points of emphasis in marketing his equipment in his market segment," Norvell said. "It is hoped that this information can be used as a guideline for dealer awareness of farmer buying behavior."

For anyone who'd like to ponder the survey results in more depth, free copies are available from Dr. Wayne Norvell, KSU Marketing Dept., Calvin Hall, Manhattan, Kan. 66506.

## What farmers want in a dealer:

Conclusions for dealers: Offer service, trade-in value, be honest, and keep quality products on hand. Give information on product, especially to farmers under age 30. Atmosphere, reputation and reliability don't seem to matter much.

### Dealer Characteristics

*Figures are a per cent of total.*

| Age | Service | Atmosphere | Trade-In | Product Information | Reputation | Reliability | Quality and Availability | Honesty | Total Number Of Respondents |
|---|---|---|---|---|---|---|---|---|---|
| Under 30 | 35 | | 10 | 40 | | | 5 | 10 | **20** |
| 31-40 | 40 | 6 | 16 | 13 | 3 | | 13 | 9 | **32** |
| 41-50 | 31 | 4 | 20 | 14 | | | 12 | 11 | **56** |
| 51-60 | 42 | 4 | 21 | 4 | 2 | | 10 | 15 | **52** |
| Over 60 | 40 | 4 | 22 | 13 | 2 | 2 | 9 | 7 | **54** |
| **Total** | **40** | **4** | **19** | **14** | **1** | **0.5** | **11** | **11** | **214** |

## Who sways a buying decision?

The wife and relatives are a bigger influence on farmers' buying decisions than dealers. Friends and neighbors also carry clout, while factory reps count for almost nothing.

### Social and Business Factors

*Figures are a per cent of total.*

| Years of Farming | Neighbors | Friends | Spouse | Other Family Members | Dealers | Factory Representative | Total Number Of Respondents |
|---|---|---|---|---|---|---|---|
| 0-5 | 18 | | 36 | 36 | | 9 | **11** |
| 6-10 | 8 | 8 | 17 | 38 | 25 | 4 | **24** |
| 11-15 | 5 | | 43 | 28 | 24 | | **21** |
| 16-20 | 3 | 6 | 47 | 26 | 16 | | **30** |
| 21 & Over | 11 | 4 | 36 | 22 | 26 | 0.9 | **114** |
| **Total** | **9** | **4.5** | **36** | **26** | **23** | **1.5** | **200** |

## Service Managers

*(Continued from page 10)*

mosphere that allows a high degree of freedom. Conversely, many managers feel uncomfortable with the managerial side of the job and there appears to be a high degree of dissatisfaction with the overall compensation package.

### Job responsibilities

Turning to job responsibilities, managers view customer relations as their most important responsibility. The next four highest rated items are: *high service level, productivity, controlling expenses,* and *obtaining a net profit.*

All relate to managerial attributes that deal with the financial aspects and productivity of the shop. Least important job duties among the alternatives were shop-parts relationships, shop cleanliness, and keeping equipment in good repair.

Shop managers and their supervisors appear to be in harmony on what are the managers' most important responsibilities. The managers top five selections were also the top five that he felt his supervisor saw as his main responsibilities. The order was slightly rearranged.

In the area of personal improvement, the managers indicated *business math* and *speaking skills* as areas they would like to improve.

### Skills improvement

The question relating to technical skills improvement indicated an overwhelming desire to learn more about *computers* and *computer systems.* This was followed closely by two items relating to the financial side of the business—*accounting systems* and *understanding financial statements.* The fourth most popular response was advertising and promotion and this was followed by motivating others.

The diversity of the top five selections perhaps indicates the service manager's eagerness to be a complete manager rather than the person in the corner office whose only concern is shop operations.

This may also indicate that owners are expecting input into improving service operations by involving managers more in financial results, advertising, etc., but are not educating or preparing them to provide this input. Whatever the reason, the results of this particular question should give insight to owners as to educational programs of interest to their service department managers.

### Rating the company

When offered the chance to rate their own companies, the managers gave good marks to their employers' reputation both in the community and for service. They also felt they were communicating well on the goals, duties and responsibilities of their job. They also felt management was committed to a profitable shop.

The most negative ratings dealt primarily with human relations. Promotion opportunities were not readily foreseeable. Initial training was not seen as adequate.

It also appears that management is failing to provide the positive reinforcement on job performance and communication on company direction. Both are essential in order to build strong manager-management relationships.

### Summary

It is apparent that dealers are communicating to their service department managers what their major duties and responsibilities are. It also appears that the managers feel good about their work environment.

However, they would like more educational opportunities in areas where they are becoming increasingly more responsible. They would also appreciate recognition for a job well done, a chance to become more involved in total dealership management and a more attractive benefits package. I&T

**HI-TRAC™ SPRAYERS: Precise, High Capacity, Versatile.**

Put a Powell sprayer to work, no matter what crop you've got to work. You get precision spraying, high capacity spraying.

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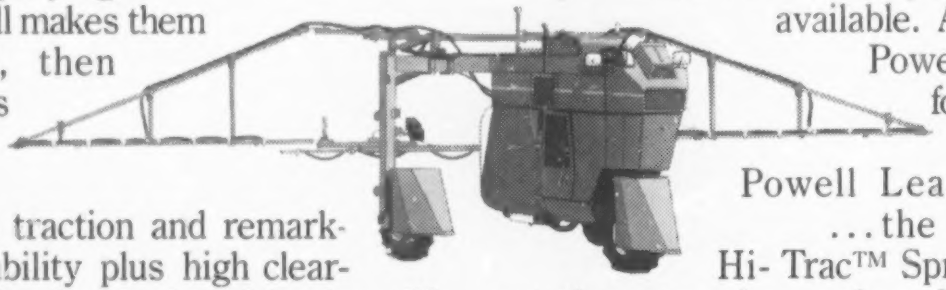

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I&T
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

---

## YODER & FREY, INC.
## Archbold, Ohio
## March 7 & 8, 1983

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Sup. A, 1952 (Fair) | 1500 |
| Sup. A, 1952 (Fair) | 1675 |
| C, 1950 (Fair) | 950 |
| C mo., 1952 (Good) | 1900 |
| C cult., 1952 (Fair) | 1000* |
| Cub Lo-Boy, | 1550 |
| 154 Lo-Boy, | 2400 |
| H, 1945 (Fair) | 750 |
| H, 1950 (Fair) | 800 |
| H, 1942 (Fair) | 750 |
| H, 1948 (Rough) | 425 |
| M, 1952 (Rough) | 450 |
| M, 1943 (Rough) | 575 |
| M, 1949 (Rough) | 375 |
| M, 1949 (Fair) | 1200 |
| M, 1950 (Good) | 1075 |
| M, 1951 (Fair) | 1050 |
| Sup. M, 1952 (Rough) | 725* |
| Sup. M, 1952 (Fair) | 960 |
| MD, (Rough) | 325 |
| 140, 1964 (Good) | 2450 |
| 300, Idr., 1956 (Good) | 1425 |
| 300, 1956 (Fair) | 1300 |
| 300, 1956 (Fair) | 1100 |
| 300, 1957 (Fair) | 1350 |
| 300, 1957 (Fair) | 700 |
| 300, 1957 (Fair) | 1150* |
| 340, mo. (Rough) | 1100* |
| 350, (Good) | 1150 |
| 3444 diesel, Idr., (Fair) | 3250* |
| 400 diesel, 1957 (Rough) | 600* |
| 2400, (Good) | 5000 |
| 424 Idr., (Fair) | 3150 |
| 560, 1961 (Fair) | 1350 |
| 560 diesel, 1960 (Rough) | 1250 |
| 560, 1960 (Fair) | 1600 |
| 544, (Fair) | 4600* |
| 656, 1968 (Good) | 3500 |
| 656, 1970 (Fair) | 4400* |
| 785 diesel, (New) | 11,000 |
| 785 diesel, (New) | 10,000 |
| 706 diesel, 1965 (Good) | 5400* |
| 756, 1970 (Fair) | 3000 |
| 756, 1968 (Fair) | 3550* |
| 766, 1975 (Fair) | 4050* |
| 806, 1963 (Good) | 2700* |
| 806 diesel, 1967 (Fair) | 4500 |
| 806 diesel, 1964 (Fair) | 5500* |
| 806 diesel, 1963 (Fair) | 4550* |
| 806, duals, (Fair) | 3750 |
| 806 diesel, 1965 (Fair) | 2500 |
| 806 diesel, 1964 (Fair) | 4450 |
| 806, 1965 (Fair) | 3350 |
| 806 diesel, 1964 (Good) | 5100 |
| 826 diesel, 1970 (Good) | 6500 |
| 826 diesel, cab, (Good) | 6050 |
| 826 diesel, 1969 (Good) | 6100* |
| 856 diesel, 1969 (Fair) | 6000* |
| 856 diesel, 1968 (Fair) | 6100 |
| 856, 1967 (Fair) | 3050 |
| 886, 1980 (Good) | 9500 |
| 966 diesel, cab, (Good) | 9250 |
| 966 diesel, 1967 (Fair) | 6100* |
| 966 diesel, 1972 (Fair) | 7300* |
| 986 diesel, 1980 (Good) | 13,500* |
| 1026, (Fair) | 7300* |
| 1026 diesel, | 3250 |
| 1066 diesel, 1976 (Good) | 6000* |
| 1066 diesel, | 8600 |
| 1066 diesel, 1975 (Fair) | 7925 |
| 1066 diesel, 1975 (Good) | 7650 |
| 1066 diesel, 1975 (Good) | 8400 |
| 1066 diesel, 1974 (Good) | 7000* |
| 1066 diesel, 1976 (Good) | 7800 |
| 1066 diesel, 1975 (Good) | 7700 |
| 1066 diesel, 1974 (Good) | 7600 |
| 1086 diesel, 1978 (Good) | 11,750* |
| 1086 diesel, 1979 (Fair) | 13,250 |
| 1086 diesel, 1979 (Excellent) | 16,000 |
| 1086 diesel, 1980 (Excellent) | 14,100 |
| 1086 diesel, 1979 (Good) | 12,900 |
| 1206 diesel, 1967 (Fair) | 4400 |
| 1206 diesel, cab, (Fair) | 4750 |
| 1456 diesel, 1970 (Fair) | 4600* |
| 1456 diesel, cab, 1967 (Good) | 7700* |
| 1456 diesel, 1968 (Fair) | 5500* |
| 1456 diesel, 1967 (Good) | 6500 |
| 1466 diesel, 1973 (Fair) | 6400* |
| 1466 diesel, 1975 (Good) | 9250* |
| 1466 diesel, 1975 (Good) | 8500 |
| 1466 diesel, 1974 (Good) | 9100 |
| 1468 diesel, 1972 (Fair) | 6500 |
| 1486 diesel, duals, (Excellent) | 18,500* |
| 1486 diesel, 1978 (Good) | 15,600* |
| 1566 diesel, 1975 (Fair) | 9500* |
| 1566 diesel, 1976 (Fair) | 9000* |
| 1586 diesel, 1978 (Excellent) | 13,000* |
| 1586 diesel, 1978 (Rough) | 9500* |
| 3588 diesel, 1978 (Fair) | 17,250* |
| 3588 diesel, 1980 (Excellent) | 23,250* |
| 4166 diesel, (Fair) | 8750* |
| 4166 diesel, | 9000 |
| 414, | 1400 |

**CASE TRACTORS**

| | |
|---|---|
| 730, 1967 (Rough) | 1100 |
| 730 diesel, (Fair) | 1500 |
| 830, 1965 (Rough) | 2650 |
| 830 diesel, 1968 (Fair) | 1775* |
| 930, (Rough) | 1475 |
| 930, 1967 (Fair) | 2750 |
| 930 diesel, 1967 (Fair) | 2300* |
| 90 diesel, 1965 (Rough) | 2850 |

(More...)

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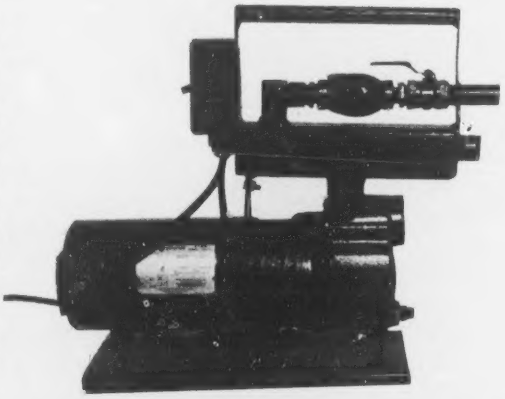

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## Auctions

*(continued)*

| | |
|---|---|
| 970 diesel, (Good) | 5750 |
| 1030 diesel, 1968 (Fair) | 3800* |
| 1080, (Fair) | 3000 |
| 1080, 1966 (Fair) | 3900 |
| 1070 diesel, 1974 (Good) | 8800 |
| 1070 diesel, 1969 (Good) | 6400 |
| 1270 diesel, 1972 (Good) | 8000 |
| 1370 diesel, 1971 (Rough) | 9800 |
| 1370 diesel, 1973 (Fair) | 9500* |
| 1370 diesel, 1971 (Fair) | 8000 |
| 1470 diesel, (Rough) | 8200 |
| 2470, (Rough) | 11,500* |
| 2670 diesel, 1977 (Fair) | 17,250* |

### COCKSHUTT TRACTORS

| | |
|---|---|
| 30, 1948 (Rough) | 370 |
| 540, (Fair) | 850* |
| 1650 diesel, 1967 (Fair) | 3900 |

### MINNEAPOLIS – MOLINE TRACTORS

| | |
|---|---|
| G-1000, 1969 (Fair) | 2400* |
| G-1000, (Fair) | 2550* |
| G-1050 diesel, (Fair) | 4000 |
| Z, 1949 (Rough) | 325 |
| U, 1949 (Fair) | 475 |

### FORD TRACTORS

| | |
|---|---|
| 8N, 1952 (Fair) | 1675 |
| 8N, 1949 (Rough) | 950 |
| 8N, 1950 (Rough) | 620 |
| 8N, 1948 (Rough) | 750 |
| 8N, ldr., 1950 (Fair) | 1400 |
| 8N, 1951 (Fair) | 900* |
| 9N, 1946 (Rough) | 875 |
| 9N, 1942 (Rough) | 875 |
| 9N, 1943 (Fair) | 840 |
| 9N, 1944 (Rough) | 875 |
| 9N, 1944 (Rough) | 925 |
| 600, 1957 (Rough) | 1625* |
| 600, 1956 (Rough) | 1750* |
| 2000, 1968 (Fair) | 2550 |
| 2000, 1968 (Fair) | 2650 |
| 961, 1958 (Good) | 1825 |
| 4000, 1970 (Fair) | 3250 |
| 4000, 1973 (Fair) | 4400 |
| 4000, 1969 (Fair) | 3900 |
| 4000, 1970 (Rough) | 3400 |
| 4000 diesel, 1964 (Good) | 3300 |
| 4000 diesel, 1970 (Fair) | 3650 |
| 4100 diesel, 1976 (Good) | 5800* |
| 5000 diesel, 1969 (Fair) | 5600 |
| 5000, 1969 (Fair) | 4400 |
| 5000, 1971 (Fair) | 4200* |
| 6000, 1966 (Rough) | 1125 |
| 6000 diesel, 1960 (Good) | 1500* |
| 6000, (Fair) | 1400 |
| 8000 diesel, 1971 (Rough) | 4300* |
| 8000 diesel, 1971 (Fair) | 4900 |
| 8600, 1975 (Fair) | 6400 |
| 8699 diesel, cab, | 6600 |
| 9000 diesel, cab, (Good) | 6550 |
| 9600 diesel, cab, (Good) | 7500 |
| 9600 diesel, 1975 (Fair) | 6250 |
| 9700 diesel, 1978 (Good) | 14,000 |
| 3000, 1972 (Fair) | 2700 |
| 3000 diesel, 1971 (Fair) | 2950 |
| 3000, 1971 (Fair) | 2610 |
| 3000, 1971 (Fair) | 4000 |
| 3000 diesel, 1970 (Fair) | 3650 |
| 6600 diesel, 1979 (Good) | 7400* |
| Jub. | 975 |
| Jub. 1953 (Good) | 2350 |
| Jub. duals, (Fair) | 1600 |
| Jub. 1953 (Fair) | 1700 |
| Jub. 1953 (Rough) | 1750 |
| 860, ldr., 1956 (Rough) | 1800 |
| 860, 1957 (Good) | 2550 |

### MASSEY-HARRIS TRACTORS

| | |
|---|---|
| 22, 1949 (Fair) | 525* |
| 44, 1948 (Fair) | 475* |
| 44, 1951 (Fair) | 725 |
| 44, 1947 (Rough) | 275 |
| Pony, 1947 (Fair) | 500* |
| Pacer, 1945 (Fair) | 600* |

### WHITE TRACTORS

| | |
|---|---|
| 2-105, cab, (Good) | 10,000* |
| 2-105 diesel, cab, (Good) | 10,800 |

### JOHN DEERE TRACTORS

| | |
|---|---|
| A, 1950 (Rough) | 350 |
| A, 1951 (Fair) | 600* |
| B, | 270 |
| B, | 675 |
| G, 1949 (Rough) | 750 |
| 40, 1956 (Fair) | 875 |
| 40, 1956 (Fair) | 950* |
| 40, 1954 (Rough) | 700 |
| 40, 1953 (Fair) | 1350* |
| 40, 1954 (Fair) | 1050* |
| 60, 1955 (Fair) | 1025 |
| 60, 1956 (Good) | [illegible]100 |
| 60, 1954 (Rough) | [illegible]25* |
| 70, 1954 (Fair) | 800* |
| 70, 1954 (Rough) | 875 |
| 530, 1958 (Fair) | 1650 |
| 620, 1956 (Fair) | 1300 |
| 620, 1957 (Fair) | 14[illegible]5 |
| 720 diesel, 1959 (Fair) | 10[illegible] |
| 720, 1958 (Fair) | 11[illegible] |
| 720 diesel, 1958 (Fair) | 1700 |
| 720 diesel, 1957 (Good) | 1650* |
| 720 diesel, 1956 (Rough) | 1725* |
| 720 diesel, 1957 (Fair) | 1350 |
| 730 diesel, 1958 (Fair) | 1350* |
| 730, | 2400 |
| 730 | 1375 |
| 730 diesel, duals, (Good) | 2000 |
| 730 diesel, 1959 (Fair) | 1450 |
| 820 diesel, 1959 (Rough) | 1900* |
| 2010, 1961 (Fair) | 2600 |
| 2010, 1963 (Fair) | 1925* |
| 2020, (Fair) | 3700* |
| 2020 diesel, (Rough) | 2700 |
| 2510, | 2800 |
| 2530 diesel, 1975 (Good) | 8250 |
| 2840 diesel, 1978 (Good) | 11,000 |
| 3010, 1961 (Fair) | 2500* |
| 3010, diesel, (Fair) | 3500 |
| 3010, 1962 (Good) | 3600* |
| 3010 diesel, 1962 (Fair) | 4900 |
| 3020 diesel, 1970 (Good) | 5600* |
| 3020 diesel, 1969 (Good) | 5400* |
| 3020 diesel, 1966 (Good) | 4350 |
| 3020 diesel, 1969 (Fair) | 4850 |
| 4000 diesel, 1968 (Fair) | 6400* |
| 4010 diesel, 1964 (Fair) | 4100 |
| 4010 diesel, 1962 (Fair) | 4200 |
| 4010 diesel, 1963 (Fair) | 3900 |
| 4010, 1963 (Fair) | 3800 |
| 4010 diesel, 1962 (Good) | 5300 |
| 4010, 1962 (Good) | 4050 |
| 4020, 1967 (Good) | 6000 |
| 4020 diesel, 1964 (Fair) | 5600* |
| 4020 diesel, 1966 (Fair) | 5100* |
| 4020 diesel, cab, (Good) | 6050 |
| 4020 diesel, 1967 (Good) | 4750 |
| 4020 diesel, 1964 (Fair) | 4600* |
| 4020 diesel, 1968 (Fair) | 4650 |
| 4020 diesel, 1968 (Good) | 6650 |
| 4020 diesel, 1965 (Fair) | 5100 |
| 4020 diesel, 1967 (Fair) | 4000 |
| 4020 diesel, 1964 (Rough) | 3800 |
| 4020 diesel, | 6975 |
| 4020 diesel, 1967 (Fair) | 5900* |
| 4020 diesel, 1966 (Good) | 5500 |
| 4030 diesel, | 9000 |
| 4230 diesel, | 10,000 |
| 4240 diesel, (Good) | 14,000 |
| 4320 diesel, 1971 (Good) | 8800 |
| 4320 diesel, 1972 (Fair) | 7150 |
| 4320 diesel, (Good) | 7900* |
| 4430 diesel, 1977 (Good) | 12,700 |

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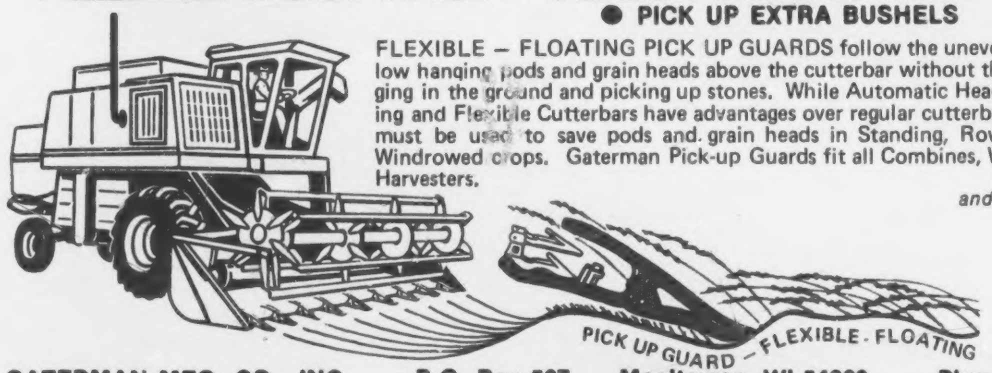
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| | |
|---|---|
| 4430 diesel, 1977 (Good) | 13,000 |
| 4430 diesel, 1976 (Good) | 12,200* |
| 4430 diesel, 1976 (Good) | 11,000 |
| 4430 diesel, 1976 (Fair) | 9000* |
| 4440 diesel, (New) | 28,750 |
| 4620 diesel, 1972 (Fair) | 5250 |
| 4640 diesel, (New) | 33,000 |
| 5020 diesel, cab, (Rough) | 4750* |
| 5020 diesel, 1968 (Good) | 7750 |
| 6030 diesel, 1975 (Good) | 10,300* |
| 6030 diesel, 1975 (Good) | 12,500* |
| 6030 diesel, 1976 (Fair) | 12,500* |
| 7520 diesel, 1971 (Fair) | 15,000 |
| 8430 diesel, 1976 (Good) | 22,000* |
| 8430 diesel, blade, (Fair) | 17,350 |

### OLIVER TRACTORS

| | |
|---|---|
| 77, 1951 (Rough) | 375 |
| 77, 1951 (Rough) | 370 |
| 77, 1952 (Fair) | 1025 |
| 77, 1950 (Rough) | 375 |
| 88 diesel, 1948 (Fair) | 875 |
| 880, 1957 (Rough) | 375 |
| 880 diesel, | 1225 |
| 1600, 1962 (Fair) | 1800 |
| 1650, 1965 (Fair) | 2950 |
| 1655, | 4400 |
| 1800, 1961 (Rough) | 2400* |
| 1850, 1966 (Good) | 1725 |
| 1850, 1966 (Fair) | 3350 |
| 1850 diesel, 1966 (Fair) | 3700 |
| 1950, | 5000 |
| 1950 diesel, duals, (Rough) | 2600 |

### DAVID BROWN TRACTORS

| | |
|---|---|
| 990, (Fair) | 3250* |
| 990 diesel, (Fair) | 1825 |
| D, | 1350 |
| 400 diesel, (Rough) | 2150 |
| 400 diesel, 1952 (Fair) | 1000 |
| 600, 1954 (Fair) | 700 |

### ALLIS-CHALMERS TRACTORS

| | |
|---|---|
| B, | 370 |
| B, 1947 (Fair) | 490 |
| C, 1948 (Rough) | 285 |
| CA, 1950 (Fair) | 650 |
| WC, 1940 (Fair) | 360 |
| WC, 1946 (Fair) | 310 |
| WD, 1947 (Fair) | 325 |
| WD, 1947 (Rough) | 460* |
| WD, 1950 (Rough) | 320 |
| WD-45, | 875 |
| WD-45, 1950 (Good) | 1050 |
| WD-45, 1951 (Rough) | 500 |
| D-14, cult., (Fair) | 1500 |
| D-14, 1963 (Fair) | 1375 |
| D-15, 1964 (Fair) | 2900 |
| D-15, 1963 (Rough) | 1200* |
| D-17, 1965 (Rough) | 1100* |
| 175 diesel, cab, (Good) | 7900 |
| 180 diesel, 1970 (Fair) | 3650 |
| 185, (Fair) | 7500* |
| 190XT diesel, 1970 (Good) | 5700* |
| 190XT diesel, 1970 (Fair) | 4000 |
| 200 diesel, 1974 (Fair) | 6400 |
| 200 diesel, 1974 (Good) | 5800 |
| 200 diesel, 1974 (Good) | 7900* |
| 210 diesel, 1972 (Fair) | 4200 |
| 220, 1969 | 6000* |
| 5020 diesel, 1981 (Good) | 4475 |
| 7000 diesel, | 13,050 |
| 7000 diesel, 1975 (Good) | 6900 |
| 7030 diesel, | 8100 |
| 7050, 1974 (Good) | 10,500* |
| 7050 diesel, | 11,000 |
| 7080 diesel, 1977 (Good) | 11,250* |
| 7580 diesel, 1979 (Good) | 15,400* |
| 440, (Fair) | 9400* |

### FERGUSON & MASSEY-FERGUSON

| | |
|---|---|
| TO-35 diesel, 1959 (Fair) | 1800 |
| TO-35, 1959 (Rough) | 1750 |
| 35 diesel, 1961 (Rough) | 2100 |
| 65, 1964 (Fair) | 2350 |
| 65, 1966 (Fair) | 2200 |
| 65, 1962 (Rough) | 1600* |
| 65, 1959 (Good) | 2500 |
| 65, 1960 (Fair) | 1900* |
| 90, 1963 (Fair) | 2250 |
| 165, | 3750 |
| 165, 1970 (Fair) | 3950 |
| 165, 1969 (Rough) | 3000 |
| 165, 1963 (Rough) | 2600 |
| 175 diesel, 1970 (Fair) | 4200 |
| 180 diesel, 1967 (Fair) | 4000 |
| 235 diesel, 1974 (Good) | 3900 |
| 1080 diesel, | 3850 |
| 1080 diesel, 1972 (Fair) | 4350 |
| 1080 diesel, 1970 (Fair) | 4000 |
| 1105, (Rough) | 5000 |
| 1130 diesel, 1969 (Fair) | 3650* |
| 1130 diesel, 1969 (Good) | 4650* |
| 1135 (Good) | 8500* |
| 1135 diesel, 1978 (Good) | 9250 |
| 1135 diesel, 1975 (Rough) | 5800 |
| 1150 diesel, 1969 (Fair) | 5800* |
| 1150, 1971 (Fair) | 5800* |
| 1150 diesel, 1970 (Good) | 4800 |
| 1800, 1974 (Fair) | 7900* |
| 1155 diesel, (Fair) | 8300* |

### DEUTZ TRACTORS

| | |
|---|---|
| D6806, 1977 (Excellent) | 7950 |
| D13006, (Fair) | 9600 |

## ENLOW AUCTION CO.
## Tulsa, Oklahoma
## March 12, 1983

### ALLIS-CHALMERS TRACTORS

| | |
|---|---|
| B, 1948 (Fair) | 575 |
| WD-45, 1955 (Fair) | 650 |
| D-14, 1960 (Good) | 2500 |
| D-17 diesel, 1958 (Good) | 2150 |
| D-17 LP, 1962 (Good) | 2500 |
| D-19 diesel, 1961 (Rough) | 1500 |
| D-19, LP, ldr., 1963 (Good) | 2500 |
| 5040 diesel, 1981 (Excellent) | 5400* |

### FORD TRACTORS

| | |
|---|---|
| 9N, 1940 (Rough) | 825 |
| 9N, 1941 (Good) | 1200 |
| 9N, 1942 (Fair) | 950* |
| 9N, 1942 (Good) | 1200 |
| 9N, 1943 (Good) | 1150* |
| 9N, 1944 (Good) | 1100 |
| 9N, 1944 (Fair) | 900* |
| 9N, 1946 (Good) | 1550 |
| 9N, 1946 (Fair) | 950 |
| 9N, 1946 (Good) | 1275 |
| 9N, 1946 (Good) | 1400 |
| 8N, 1948 (Good) | 1625 |
| 8N, 1948 (Good) | 1850 |
| 8N, 1949 (Good) | 1850 |
| 8N, 1950 (Good) | 1525 |
| 8N, 1950 (Good) | 1500 |
| 8N, 1951 (Rough) | 850* |
| 8N, 1951 (Fair) | 1100* |
| 8N, 1951 (Good) | 2300 |
| 8N, 1952 (Good) | 1500 |
| 8N, 1952 (Good) | 1700 |
| NAA, ldr., 1953 (Good) | 2375 |
| NAA, 1953 (Fair) | 1700 |
| NAA, 1954 (Good) | 2450 |
| 660, 1956 (Good) | 2300 |
| 641, 1959 (Good) | 2800 |
| 641, forklift, 1960 (Good) | 2000* |
| 641, ldr., 1960 (Good) | 3100 |
| 801, 1959 (Good) | 2600 |
| 2000, 1966 (Good) | 3100 |
| 3000 diesel, 1968 (Good) | 3650* |
| 4000, 1967 (Good) | 3100* |

(More...)

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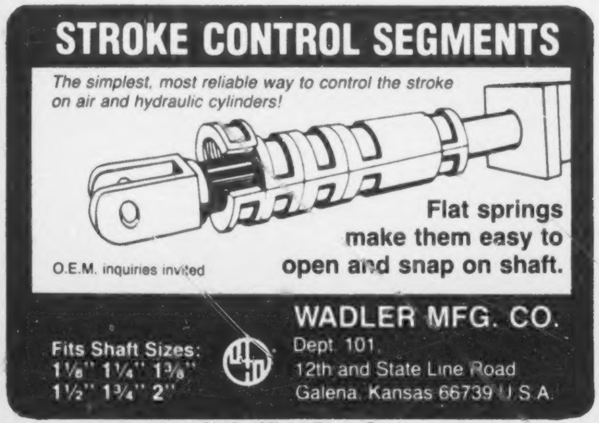
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# Auctions

*(continued)*

| | |
|---|---|
| 4000, Select-O-Speed, 1968 (Good) | 2750 |
| 8000 diesel, 1967 (Fair) | 3900* |
| 2600 diesel, 1979 (Excellent) | 4500 |
| 9600 diesel, 1976 (Fair) | 5000* |
| 3610 diesel, 1980 (Good) | 6050* |
| 1300 diesel, 4WD, 1981 (Excellent) | 4200 |

**FERGUSON TRACTOR**

| | |
|---|---|
| 40, 1962 (Good) | 2500 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Cub, 1960 (Good) | 850* |
| Cub, mo., 1964 (Good) | 1750* |
| 185 Cub, mo., 1969 (Fair) | 2350 |
| 185 Cub, mo., 3-pt, 1978 (Excellent) | 3800 |
| A, equip., 1945 (Good) | 725* |
| A, 1947 (Good) | 500* |
| Super A, 1952 (Fair) | 650 |
| Super C, mo., 1953 (Good) | 1750 |
| H, 1946 (Good) | 600 |
| W-6, diesel, 1954 (Fair) | 400* |
| 300 diesel, 1956 (Good) | 1000* |
| 460 diesel, 1961 (Good) | 2250 |
| 706 diesel, 1965 (Fair) | 1950 |
| 806 diesel, 1966 (Fair) | 3800 |
| 574 diesel, ldr., 1975 (Good) | 4950* |
| 2544 diesel, ldr., 1971 (Good) | 4300 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| MT, 1950 (Good) | 750 |
| MT, 1951 (Good) | 900 |
| 40, 1954 (Fair) | 500* |
| 70, LP, 1955 (Good) | 1500 |
| 420, 1957 (Fair) | 1000* |
| 430, 1960 (Good) | 2150 |
| 1010, 1962 (Rough) | 880 |
| 1010, 1964 (Good) | 2200 |
| 1020, 1971 (Good) | 3600 |
| 2010, 1963 (Good) | 2050 |
| 2010, 1964 (Good) | 1700 |
| 3020, 1970 (Good) | 5600 |
| 2640, 1978 (Good) | 7150 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| Pony, (Good) | 1075 |
| 35, 1961 (Good) | 2350 |
| 35, diesel, 4-cyl., 1961 (Fair) | 1300 |
| 35 diesel, 1962 (Good) | 2000 |
| 35, 1963 (Good) | 2100* |
| 50, 1962 (Good) | 2600 |
| 50, 1963 (Good) | 2200 |
| 65, ldr., 1960 (Good) | 2300 |
| 65 diesel, 1960 (Fair) | 1900* |
| 65, 1961 (Good) | 2250* |
| 65 diesel, 1962 (Good) | 2800* |
| 65, 1962 (Good) | 3050 |
| 65 diesel, 1964 (Excellent) | 3750* |
| 65 diesel, 1964 (Good) | 3025 |
| 65, 1964 (Good) | 2750* |
| 165 diesel, 1965 (Good) | 3000* |
| 165 diesel, 1965 (Good) | 3100 |
| 165 diesel, 1966 (Fair) | 2950 |
| 165 diesel, 1968 (Good) | 3500 |
| 165 diesel, 1968 (Rough) | 2450* |
| 165 diesel, 1970 (Good) | 4100 |
| 165 diesel, 1971 (Good) | 4050 |
| 165 diesel, 1973 (Good) | 4300 |
| 165 diesel, 1974 (Good) | 4675 |
| 175 diesel, 1965 (Fair) | 3000* |
| 175 diesel, 1967 (Good) | 3600 |
| 175 diesel, 1968 (Good) | 3650 |
| 285 diesel, cab, 1979 (Good) | 8500 |
| 285 diesel, 1982 (New) | 10,100 |
| 1100 diesel, 1965 (Good) | 4100 |
| 1100 diesel, 1971 (Good) | 5500* |

**LEYLAND TRACTOR**

| | |
|---|---|
| 584 diesel, 1960 (Fair) | 1625 |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| G-6 diesel, 1959 (Good) | 1000 |
| M-602 diesel, 1964 (Good) | 3500* |

**OLIVER TRACTOR**

| | |
|---|---|
| Super 55, ldr., 1956 (Good) | 2000 |

**NOTES**

Prices reported are for individual sales at wholesale on "as is," "cash and carry" basis.

Prices reported are NOT averages.

**Condition classifications: EXCELLENT means—Engine: in perfect condition, 400 to 600 hours of use; Rubber: 80% tread remaining, no breaks or cracks; Paint: original and bright; General Appearance: excellent.**

**GOOD means—Engine: good running condition; Rubber: 70% tread remaining, no breaks or cracks; Paint: original paint or a good repaint job; General Appearance: good over-all.**

**FAIR means—Engine: possibly in need of a minor overhaul to restore; Rubber: 60% tread remaining, some cracking evident in side walls; Paint: only fair, weathered and some rust apparent; General Appearance: worn, some dents, minor parts such as gage covers missing or broken.**

**ROUGH means—Engine: obviously in need of a major overhaul; Rubber: smooth; Paint: scarred, weathered, rusty, needs painting urgently; General Appearance: dents, ruptures, broken parts, loose wires, some components such as lights broken, missing or inoperative.**

**DEMONSTRATOR means—used for demonstrating only and in practically new condition.**

**Implement & Tractor**

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**Loveland, Colorado:** *Bob Hopkins,* 320 Cleveland Ave., Suite 9, Loveland, CO 80537—303/663-4596

**Sherman Oaks, California:** *Glenn Dobyns,* 13437 Ventura Blvd., Suite 209, Sherman Oaks, CA 91423—213/990-7360

**London, England:** *John Ashcraft & Co.,* 12 Bear Street, Leicester Square, London WC2H 7AS, England—930-0525, Telex: 8952387

**Badhoevedorp, Holland:** *John Ashcraft & Co., John J. Lucassen,* Mgr. for Benelux & Germany, Akerdijk 150 A, 1171 PV Badhoevedorp, Holland—2968-6226, Telex 18406 HARKE NL

**Tokyo, Japan:** *International Media Representatives, Ltd., Sumio Oka,* 2-29, Toranomon 1-chome, Minato-ku, Tokyo 105, Japan—502-0656

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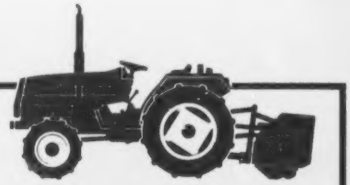

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Excellent opportunity to enhance present business by selling "high profit potential" line of compact and medium-size tractors. Franchises available in prime marketing areas. Mitsubishi offers quality engineered products, high consumer name acceptance and top-rated sales support and advertising programs. Contact: Y. Watanabe, Mitsubishi Tractor Div., Sumitomo Corp., 345 Park Avenue, New York, NY 10154, (212) 935-8824.

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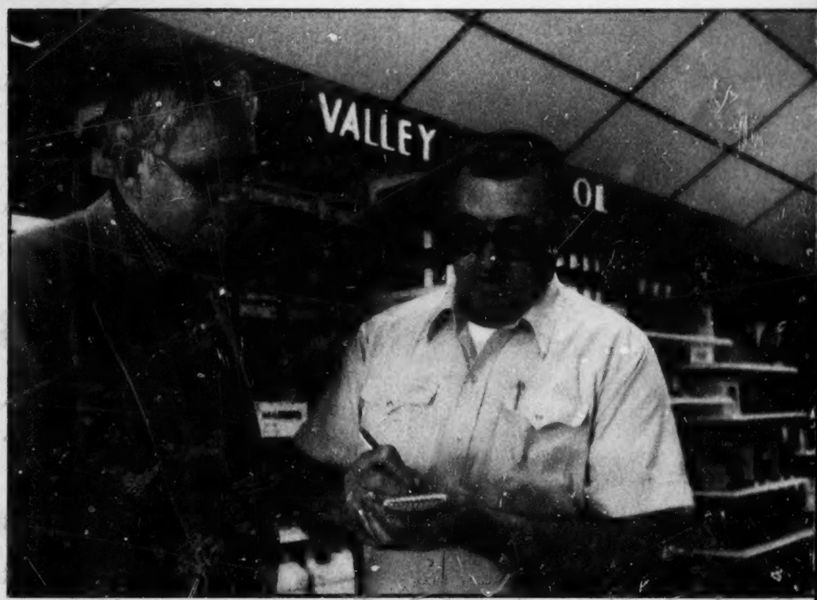
*The business magazine of the farm & industrial equipment industry*

June 1983
TWO DOLLARS

# Implement & Tractor

C4725-1 6/23/83

## How Salesmen Are Paid At Vavrina's



## Sales Forecast Update

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INTERTEC PUBLISHING CORP.

**Implement & Tractor**

*The business magazine of the farm & industrial equipment industry*

June 1983 • Vol. 98 • No. 8

page 12

page 16

**8:** **Paying the Salesmen.** At Vavrina's, the salesmen are paid a percentage of profit on new units, and get motivated to clear used goods off the lot.

**12:** **FEMA Spring Session:** The shortliners feel positive about PIK; speakers uncover tips for growth in mature markets, understanding employees better, and winning the game called negotiation.

**16:** **Even With Computers, It's Still a People Business.** Dealers who use electronic management find they can't ignore the people who must run the computers.

**20:** **Post-PIK Predictions:** FIEI forecasters see most items down in '83, though actual retail sales on some products are up.

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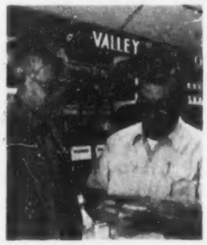

**On the cover**—Dealer Ron Vavrina and Curtis Koehn, salesman, discuss a deal. Commission is keyed to profit.

DEPARTMENTS

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# I&T Update

## Mixed Signals Through a Wet Spring

Is farm equipment beginning its 1983 renaissance? It depends on the product in question, with whom you've been talking and what you've seen lately. The April flash report of the Farm & Industrial Equipment Institute shows combine sales down after four straight months of sales improvement. Small tractors, mostly Japanese, showed their first weakness of 1983 and over-140-hp units showed their first strength. Meanwhile, hay tools continued their upward movement. Auctions visited by I&T in late April and May showed mixed trends. But some dealers were reporting a re-awakening of farmer interest in big equipment. And wet weather delayed field work in many areas. The FIEI flash report:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | April | | | January-April | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| **Farm Wheel Tractors:** | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 4,918 | 5,706 | (13.8) | 14,004 | 14,415 | ( 2.9) |
| 40-100 hp | 3,608 | 4,212 | (14.3) | 11,866 | 14,107 | (15.9) |
| 100-140 hp | 1,659 | 1,992 | (16.7) | 5,257 | 7,846 | (33.0) |
| Over 140 hp | 1,375 | 1,158 | + 18.7 | 3,688 | 4,257 | (13.4) |
| **Total 2-wheel drive** | **11,560** | **13,068** | **(11.5)** | **34,815** | **40,625** | **(14.3)** |
| 4-wheel drive | | | | | | |
| Under 200 HP | 202 | 373 | (45.8) | 608 | 1,383 | (56.0) |
| Over 200 HP | 188 | 405 | (53.6) | 755 | 1,322 | (42.9) |
| **Total 4-wheel drive** | **390** | **778** | **(49.9)** | **1,363** | **2,705** | **(49.6)** |
| **Total All Tractors** | **11,950** | **13,846** | **(13.7)** | **36,178** | **43,330** | **(16.5)** |
| S-P Combines | 538 | 590 | ( 8.8) | 3,644 | 2,960 | + 23.1 |
| Balers (200-lb. bales) | 492 | 376 | + 30.9 | 1,723 | 1,292 | + 33.4 |
| Forage Harvesters (Shear-bar type) | 149 | 182 | (18.1) | 624 | 797 | (21.7) |
| Mower-Conditioners | 821 | 624 | + 31.6 | 2,600 | 2,187 | + 18.9 |

## Deere Will Appeal Decision on Its Max-Emerge Patents

Deere & Co. plans to appeal the outcome of a jury trial that resulted in the invalidating of four of five Deere patents on its Max-Emerge planter. The decision arose in the first segment of a two-part trial in federal district court at Cedar Rapids, Iowa, between Deere and Kinze Mfg. Co., Williamsburg, Iowa.

Deere was plaintiff in the first part of the trial and defendant in the second. According to a Deere spokesman, the second part was settled out of court.

Patents declared invalid were:

1. The Keeton (expiring in 1984), covering the mechanical finger-type mechanism.
2. The Hansen (expiring in 1988), covering improvements in finger mechanism shape.
3. The Brass-Hansen (expiring in 1994), which improves the seed furrow opening device.
4. The Brass patent (expiring 1993), which relates to a pull lever for manually engaging the drive unit to individual planter units.

A fifth patent, the Pust, which covers a seed furrow opening device, was held by the jury to be valid but unenforceable because it was obtained through "inequitable conduct," in that existing prior art was not called to the patent examiner's attention.

## Briefly....

**Automatic Data Processing, Inc.** has said it will provide services to International Harvester dealers, starting in 18 to 24 months. Each IH dealer, according to ADP, will decide whether to sign for the service under three- to seven-year agreements.

**Kelley Mfg. Co.,** Tifton, Ga., intends to market personal computers and software primarily for on-farm applications. The package: Docutel/Olivetti M20, a 160K unit with dual floppy disk storage, printer and other accessories. Software comes from a specialist in farm programming.

**Hesston Corp.** had a first period loss of $4.87 million on sales of $37.6 million. Year earlier figures: A loss of $3.3 million on sales of $59 million. Hesston sold its European subsidiary late in 1982. Otherwise, first-quarter, 1983, sales would have been $48 million, with a loss of $2.68 million....James D. Gaeddert has moved to the position of vice-president of sales.

**International Harvester's** second quarter produced an operating loss of $84 million, compared with a $172 million loss a year earlier. Sales for the period were $996 million, down from $1.26 billion in 1982's second period. Six-month sales were $1.72 billion, down from $2.16 billion in 1982.

**The Forging Industry Assn.,** Cleveland, one of 27 trade associations participating in the Metalworking Fair Trade Assn., is claiming that the Italian government is subsidizing the sale of crawler track rollers in the U.S. at less than fair market value. The association quotes a distributor price of $67 on roller units compared with an American-made unit's price of $127.

## Kubota: Final Assembly Begun at Compton, Norcross

**Kubota Tractor Corp.** has begun final assembly operations at its Compton, Calif., and Norcross, Ga., branches on its M series tractors, which run from 47 to 76 pto horsepower. Kubota gets the basic tractor from Japan, adds wheels, tires, cabs, rollbars, and certain hydraulic and other options, such as wide axles. Tires are generally sourced in the U.S., as are the rollbars. Cabs come from Japan. Hydraulics are Japanese.

M4950
KUBOTA

In the M4950 driver's seat: Richard Fadness, Melroe Equip. Co., Gardena, Calif., with the first unit out of the Compton facility, bound for an orchard application. Left: Kevin Norioka, Kubota executive vice-president; right: Gene Souza, Kubota sales rep.

## Editor's Notebook

*(continued)*

basic ingredients are present in both situations. And dealers ought to be able to play important roles in both. They know their customers and how they farm. They can learn about the systems and how they apply. And they understand what a basic commitment to service means.

It could be, of course, that computer technology will become so refined that everything will be sold on a throwaway basis. It would be cheaper to toss out your malfunctioning system and get a new one, just like your TV set. Or the small computer industry could reform itself and those outlets become highly service oriented. (I'd bet on the first situation happening before I'd bet on the second.) Maybe dealers wouldn't fit in such a world.

And now that I've said all that, I'll say something else: Those market researchers at Frost & Sullivan may be undershooting the mark when they set it at $428 million in five-year farmer outlays for hardware and software. If the top 240,000 farmers average $4,000 in purchases over the next five years, that's $960 million. Add just five per cent for service and it's over a billion dollars.

## Biggest Tractor Deal Of the Past 12 Months?

Frankly, I don't know. So I'll tell you about this one and call it the biggest. If I'm wrong, you can shoot me down and tell me about one that's bigger.

Ever hear of Blaine Kern Artists Inc.? Based in New Orleans, it's said to be the world's biggest designer and builder of parade floats. And Blaine Kern also conducts the parades that go on in New Orleans at Mardi Gras time—something like 38. On some of those days, the Kern group is running three or four parades involving 90 to 104 floats.

Kern had a fleet of aging tractors to pull these floats, but he was having parts and service problems, he said, so he made a deal with Pete Zimbelman and Jim Tabor of Diesel Tractor & Equipment, Inc., in New Orleans to buy 100 new 70-hp Belarus Model 500 tractors.

To get the deal, Zimbelman had to contract to be parade fleet manager for the 12 days of Mardi Gras, responsible for the tractors themselves and for hiring, training and managing 100 drivers. According to a Belarus spokesman, the dealership is the biggest retailer in the U.S. for the Soviet-made tractors, averaging 40 sales a year.

According to data from the U.S. Dept. of Commerce, there were 371 tractors imported by the U.S. from the U.S.S.R. in 1979, 485 in 1980, 332 in 1981 and 4 in 1982.)

**I&T**
*SINCE 1886*

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

### JONES FARM EQUIPMENT CO.
### Dothan, Alabama
### April 12, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| 5030 diesel, 1978 (Good) | 4200 |
| 5030 diesel, 1978 (Good) | 4000 |
| 220 diesel, cab, duals, 1971 (Rough) | 2950* |
| D14, ldr., 1959 (Excellent) | 2000 |
| D14, ldr., 1957 (Good) | 1300* |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 990 diesel, 1967 (Good) | 1200* |
| 990 diesel, 1966 (Rough) | 625 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1135 diesel, 1973 (Excellent) | 6900 |
| 1085 diesel, 1977 (Good) | 5100 |
| 1085, 1973 (Fair) | 3900* |
| 1080 diesel, 1969 (Good) | 4250 |
| 285 diesel, 1979 (Excellent) | 8900* |
| 265 diesel, 1977 (Excellent) | 7500 |
| 265 diesel, 1975 (Good) | 5400* |
| 180 diesel, 1968 (Fair) | 2800* |
| 175 diesel, 1972 (Good) | 3600* |
| 175 diesel, 1966 (Good) | 3400* |
| 165 diesel, 1972 (Good) | 4100* |
| 165 diesel, 1970 (Fair) | 2800* |
| 165 diesel, 1969 (Rough) | 2050 |
| 165 diesel, 1968 (Good) | 3100 |
| 165 diesel, 1968 (Good) | 3225 |
| 165 diesel, 1968 (Good) | 3350* |
| 165 diesel, 1968 (Good) | 3250* |
| 165 diesel, 1968 (Good) | 2900 |
| 165 diesel, 1968 (Good) | 3400* |
| 165 diesel, 1968 (Good) | 2850 |
| 165 diesel, 1966 (Good) | 2950* |
| 165 diesel, 1966 (Fair) | 2600 |
| 150 diesel, 1973 (Fair) | 2400* |
| 150 diesel, 1965 (Good) | 3200* |
| 135 diesel, 1971 (Excellent) | 4200 |
| 135 diesel, 1970 (Excellent) | 3600 |
| 135 diesel, 1970 (Excellent) | 3550 |
| 135 diesel, 1968 (Good) | 2975* |
| 135 diesel, 1966 (Excellent) | 3400 |
| 65 diesel, 1961 (Rough) | 1175 |
| 50 diesel, 1960 (Rough) | 1200 |
| 40, 1957 (Fair) | 1175 |
| 35 diesel, 1963 (Good) | 2100 |
| 35 diesel, 1963 (Excellent) | 2600* |
| 35 diesel, 1963 (Good) | 2300 |
| TO30, 1953 (Good) | 1350 |
| TO30, 1953 (Fair) | 900 |
| TO30, 1953 (Fair) | 1050* |
| TO30, 1952 (Fair) | 900 |
| TO30, 1952 (Fair) | 900 |
| TO20, 1950 (Good) | 1200 |

**FORD-FERGUSON TRACTORS**

| | |
|---|---|
| 9N, 1946 (Good) | 800 |
| 9N, 1944 (Rough) | 550* |

**FORD TRACTORS**

| | |
|---|---|
| 9600 diesel, duals, 1975 (Fair) | 4500* |
| 9600 diesel, 1974 (Fair) | 4000 |
| 9600 diesel, 1974 (Rough) | 3600 |
| 9000 diesel, 1972 (Fair) | 3100 |
| 8000 diesel, 1969 (Fair) | 3250* |
| 7700 diesel, 1977 (Good) | 5750 |
| 5000 diesel, 1972 (Good) | 5150 |
| 5000 diesel, 1968 (Good) | 4000 |
| 5000 diesel, 1968 (Good) | 4150 |
| 5000 diesel, 1968 (Good) | 4000* |
| 5000 diesel, 1968 (Rough) | 2800* |
| 5000 diesel, 1967 (Fair) | 3100 |
| 5000 diesel, 1966 (Good) | 4200 |
| 4000 diesel, 1975 (Excellent) | 4900 |
| 4000 diesel, 1972 (Excellent) | 4800 |
| 4000 diesel, 1970 (Good) | 3950* |
| 4000 diesel, 1966 (Fair) | 3000* |
| 3600 diesel, 1978 (Excellent) | 6100 |
| 3400 diesel, 1968 (Rough) | 725 |
| 3000 diesel, 1978 (Good) | 3950* |
| 3000 diesel, 1978 (Excellent) | 5500 |
| 3000 diesel, 1971 (Rough) | 2250 |
| 3000 diesel, 1968 (Fair) | 2700 |
| 3000 diesel, 1968 (Fair) | 2600 |
| 3000 diesel, 1966 (Fair) | 2750* |
| 2000 diesel, 1967 (Good) | 2500* |
| 861, 1958 (Excellent) | 2300* |
| 860, 1956 (Excellent) | 2400 |
| 841 diesel, 1958 (Good) | 2000* |
| 841, 1958 (Fair) | 1650* |
| 841, 1958 (Good) | 2000 |
| 841, 1958 (Rough) | 1150 |
| 640, 1957 (Fair) | 1350* |
| 650, 1957 (Excellent) | 2550 |
| 640, 1955 (Fair) | 1350* |
| Dexta, 1959 (Good) | 1800 |
| Dexta, 1958 (Rough) | 725* |
| Dexta, 1958 (Fair) | 1225 |
| Jub., 1953 (Good) | 1800 |
| Jub., 1953 (Good) | 1700 |
| Jub., 1953 (Good) | 2000 |
| 8N, 1952 (Good) | 1600 |
| 8N, 1952 (Good) | 1750* |
| 8N, 1952 (Good) | 1750 |
| 8N, 195[illegible] (Good) | 1725* |
| 8N, 195[illegible] (Good) | 1450* |
| 8N, 1950 (Fair) | 1225 |
| 8N, 1950 (Fair) | 1350 |
| 8N, 1949 (Good) | 1700 |
| 8N, 1948 (Fair) | 1350* |
| 8N, 1948 (Fair) | 1300* |
| 8N, 1948 (Rough) | 875* |
| 8N, 1948 (Rough) | 725 |
| 8N, 1948 (Fair) | 1350 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| 1466 diesel, 1972 (Fair) | 4200* |
| 784 diesel, cab, 1978 (Good) | 3500* |
| 674 diesel, 1976 (Excellent) | 5000 |
| 674 diesel, 1975 (Fair) | 3500 |
| 574 diesel, 1973 (Fair) | 3500 |
| 574 diesel, 1973 (Fair) | 3700 |
| 504 diesel, 1964 (Good) | 1700* |
| 504 diesel, cult., 1964 (Good) | 2000 |
| 424 diesel, 1964 (Fair) | 1100 |
| 414 diesel, 1963 (Good) | 1250* |
| 300, 1955 (Fair) | 500 |
| B275 diesel, 1958 (Good) | 1175 |
| 230, 1956 (Fair) | 700 |
| C, 1948 (Good) | 475 |
| Cub Loboy, mo., 1964 (Fair) | 725 |
| Cub, mo., 1948 (Fair) | 850 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 5020 diesel, 1968 (Fair) | 4400* |
| 4840 diesel, cab, duals, 1979 (Excellent) | 24,500* |
| 4630 diesel, 1976 (Excellent) | 11,400 |
| 4230 diesel, 1975 (Good) | 9250 |

*(Continued on page 23)*

## U.S. SALES FORECAST UPDATE, 1983, 1984
## (Unit Retail Sales)

| | | Sales in 1983 as seen in.... | | Sales in 1984 as seen in.... | |
|---|---|---|---|---|---|
| **Product** | **Actual Sales 1982** | **Jan. 1983** | **May 1983** | **Jan. 1983** | **May 1983** |
| Farm Tractors | | | | | |
| Under 40 HP | 42,000E | 43,260 | 43,500 | 45,400 | 45,800 |
| 40-99 HP | 41,134 | 42,517 | 40,130 | 45,000 | 43,630 |
| 100 HP and over | 29,247 | 31,000 | 28,000 | 34,000 | 34,000 |
| Four-wheel drive | 6,763 | 7,150 | 5,975 | 7,850 | 7,100 |
| **Total (40 HP and over)** | **77,144** | **80,667** | 74,105 | **86,850** | **84,730** |
| S-P Combines | 16,205 | 18,330 | 15,800 | 20,000 | 18,000 |
| Corn Heads | 9,294 | 10,500 | 8,500 | 12,400 | 10,200 |
| Forage Harvesters (1) | 5,145 | 5,550 | 5,000 | 6,150 | 5,600 |
| Balers, Square (2) | 8,905 | 8,900 | 9,025 | 9,900 | 9,550 |
| Balers, Round (3) | 10,900E | 11,600 | 11,510 | 12,760 | 12,660 |
| Windrowers | 3,474 | 4,300 | 3,975 | 4,850 | 4,325 |
| Mower-Conditioners | 13,950 | 14,250 | 14,250 | 15,818 | 15,818 |
| Moldboard Plows | 12,025E | 12,025 | 10,220 | 12,325 | 10,525 |
| Disk Harrows | 29,300E | 30,765 | 27,835 | 33,850 | 30,620 |
| Field Cultivators | 9,675E | 10,160 | 9,675 | 11,175 | 10,640 |
| Chisel Plows | 8,700E | 9,135 | 8,350 | 10,050 | 9,200 |
| Grinder-Mixers | 5,167 | 5,400 | 5,125 | 5,825 | 5,525 |
| Manure Spreaders (4) | 11,201 | 11,680 | 11,370 | 12,800 | 12,280 |

E—I&T estimates. (1) Shear-bar type. (2) Bales under 200 lbs. (3) Bales over 200 lbs. (4) Conveyor type.
Source: Farm & Industrial Equipment Institute, Farm Equipment Div.

# Post-PIK Predictions

### Industry marketers see most items down in '83 (though actual retail sales on some products are up).

By Bill Fogarty

■ IT'S TIME to update the forecasts. How do you feel about a 2 per cent decline in dollar volume of field equipment for 1983? And a 4.1 per cent decline in farmstead and livestock equipment?

These are the consensus predictions of the Farm & Industrial Equipment Institute's Farm Equipment (field) and Agri-Equipment (farmstead) divisions, delivered May 19 at Moline, Ill., as part of the Marketing & Management Conference.

Back in January, the FED respondents, dealing with the same survey, expected volume would be unchanged from 1982. The range of their estimates then was from an improvement of 15 per cent to a decline of 18 per cent. The AED estimates were for a 5 per cent improvement; the range was from a 30 per cent rise to a 10 per cent drop.

The range of the May FED forecast was from plus-12 to minus-35 per cent; for AED, it was from plus-10 to minus-40 per cent.

**Picks a la PIK**

Information for the January outlook report was gathered late in 1982, when the government's Payment-in-Kind program was in the talk stage. Most product categories were expected to improve. (See I&T, February, and the table with this article.) But in January, when PIK became of-

(More...)

## Sales Forecast

*(continued)*

### Agri-Equipment Forecasts, 1983, 1984

**(Per cent change, retail dollar volume)**

| Product Group | Pct. Change from Previous Year 1983 | 1984 |
|---|---|---|
| Chemical Application Equipment | + 6.5 | + 5.0 |
| Portable Augers, Elevators | – 5.0 | 0.0 |
| Bin-Type Crop Dryers | – 8.0 | 0.0 |
| Batch, Continuous-Flow Dryers | – 5.0 | + 2.0 |
| Dairy and Beef Equipment | 0.0 | 0.0 |
| Hog Equipment | + 10.0 | + 6.0 |
| Grain Bins | – 25.0 | – 5.0 |
| Milking Machines | 0.0 | + 5.0 |

Source: Farm & Industrial Equipment Institute.

ficial—before the actual sign-up—a mini-survey was taken. There were important shifts.

The outlook for tractors (over 40 horsepower) slipped from 80,650 to 75,850 units to be sold at retail. Combines slipped even more steeply from 18,330 to 14,800 units. By May, the tractor outlook appeared worse—74,100 units—but combine marketers were breathing a little easier: 15,800 units.

By way of actual performance in the first quarter, according to FIEI's retail sales flash reports, some products were lagging last year's performance and even reduced expectations for 1983 (tractors over 40 horsepower), while others were substantially stronger combines, mower-conditioners, balers).

### PIK impact on manufacturers

Here's what several survey participants said about trends affecting manufacturers in the wake of the 1983 PIK program:

- **"I see a reduction** in sales of large tractors and combines in 1983 and 1984. More majors will drop manufacturing some of their less profitable items; smaller manufacturers will thus have a better chance of survival as they pick up some of the slack."
- **"...Smaller unit markets** for farm machinery will result in manufacturers rationalizing product lines and outsourcing more of the products offered. Number of independent franchises will decline. Price increases of the '70s will not be possible in this climate. Cost reductions, plant efficiencies will determine who survives."
- **"Continued move** to minimum tillage, no-till planting will reduce horsepower consumed per acre, reducing long-term large tractor sales...."
- **"Farmers more cautious** about expanding operations; more leasing and rental of equipment; ...smaller inventories carried by manufacturers."

*(Continued on page 33)*

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**3-Point PTO Unit**

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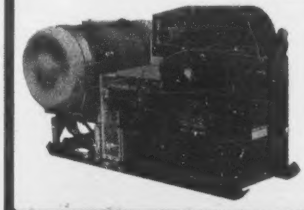

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## Auctions

*(Continued from page 6)*

| | |
|---|---|
| 4020 diesel, 1968 (Good) | 5000* |
| 4020 diesel, 1965 (Rough) | 2000 |
| 4010 diesel, 1963 (Fair) | 2600 |
| 3020 diesel, 1968 (Excellent) | 4750 |
| 3020 diesel, 1968 (Excellent) | 4500* |
| 3020 diesel, 1965 (Good) | 4100 |
| 3010 diesel, 1963 (Good) | 3350* |
| 3010 diesel, 1963 (Fair) | 2800* |
| 3010 diesel, 1962 (Rough) | 1550 |
| 2640 diesel, 1978 (Excellent) | 7100 |
| 2630 diesel, 1975 (Excellent) | 5100 |
| 2440 diesel, 1977 (Excellent) | 5900* |
| 2040 diesel, 1977 (Good) | 4300 |
| 2030 diesel, 1974 (Good) | 4100* |
| 2020 diesel, 1968 (Excellent) | 4000 |
| 2020 diesel, 1966 (Good) | 3550 |
| 2020 diesel, 1966 (Good) | 3450* |
| 2010 diesel, 1964 (Good) | 1550 |
| 2010 diesel, 1963 (Good) | 1700* |
| 1530 diesel, 1974 (Excellent) | 4600* |
| 1530 diesel, 1974 (Excellent) | 4500* |
| 1120 diesel, (Good) | 3200 |
| 1020 diesel, 1968 (Good) | 3400* |
| 1020 diesel, 1966 (Good) | 3400 |
| 830 diesel, 1975 (Excellent) | 4500* |
| 420, 1956 (Fair) | 800 |
| B, 1947 (Fair) | 375 |
| MT, cult., 1952 (Good) | 500 |
| MT, cult., 1950 (Excellent) | 750 |

**LONG TRACTOR**

| | |
|---|---|
| 560 diesel, (Excellent) | 3500 |

**LEYLAND TRACTORS**

| | |
|---|---|
| 384 diesel, (Rough) | 1350* |
| 270 diesel, (Good) | 2000 |

### YODER & FREY, INC.
### Archbold, Ohio
### April 11 & 12, 1983

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Sup. C, 1951 (Fair) | 700 |
| Sup. C, 1952 (Fair) | 1100* |
| A, cult., 1945 (Rough) | 725 |
| A, 1952 (Rough) | 1275 |
| A, 1948 (Fair) | 550 |
| A, 1948 (Fair) | 900 |
| A, | 875 |
| Cub, 1952 (Fair) | 1300 |
| Cub, 1951 (Fair) | 1325 |
| Cub, 1949 (Fair) | 1400* |
| Cub Lo-Boy, (Fair) | 1900 |
| Cub Lo-Boy, | 2600 |
| 154 Lo-Boy, (Good) | 2050* |
| H, 1951 (Good) | 750 |
| H, ldr., 1950 (Fair) | 785 |
| H, | 675 |
| H, 1946 (Rough) | 580 |
| H, 1946 (Fair) | 600 |
| SH, 1950 (Fair) | 770 |
| M, 1949 (Good) | 750 |
| M, 1950 (Fair) | 850* |
| M, 1948 (Fair) | 735 |
| M, 1950 (Fair) | 800 |
| Sup. M, 1947 (Fair) | 600* |
| Sup. M, | 550 |
| Sup. M, 1952 (Fair) | 850 |
| Sup. M, 1952 (Fair) | 900* |
| 140, cult., 1962 (Fair) | 2600* |
| 300, 1957 (Fair) | 1125* |
| 300, 1955 (Rough) | 925 |
| 340, 1962 (Rough) | 1175* |
| 350, 1965 (Good) | 820 |
| 350, 1958 (Good) | 1400 |
| 350, 1957 (Fair) | 1150 |
| Sup. A, 1953 (Rough) | 1250* |
| 400, 1957 (Fair) | 700 |
| 400 LP, | 550 |
| 400, | 1350 |
| 400, (Good) | 1050 |
| 400, 1957 (Fair) | 925* |
| 450, 1959 (Fair) | 1025 |
| 454, (Rough) | 3400 |
| 460, 1961 (Good) | 1325 |
| 460, 1961 (Fair) | 1775 |
| 504, | 835 |
| 560, 1956 (Fair) | 1550 |
| 560, 1956 (Good) | 1800* |
| 560, | 2425 |
| 560, 1961 (Rough) | 550 |
| 544, 1968 (Good) | 2800 |
| 544, 1970 (Fair) | 3700 |
| 656, 1972 (Good) | 4350 |
| 656, 1967 (Good) | 4000 |
| 674, 1978 (Good) | 5750* |
| 674, 1978 (Good) | 7850* |
| 706, 1960 (Fair) | 1900* |
| 706, | 3975 |
| 706 diesel, 1964 (Rough) | 2725 |
| 706 diesel, 1965 (Fair) | 3900 |
| 706 diesel, 1965 (Fair) | 3250 |
| 706 diesel, 1965 (Rough) | 3250 |
| 756, 1967 (Fair) | 3850 |
| 766, 1975 (Fair) | 4000 |
| 766, 1975 (Fair) | 5300* |
| 785 diesel, | 8900 |
| 806 diesel, 1965 (Fair) | 2500* |
| 806, 1964 (Fair) | 2800 |
| 806 diesel, 1967 (Good) | 5500 |
| 806, 1964 (Fair) | 2350 |
| 806 diesel, | 4350 |
| 806, | 2850 |
| 856 diesel, 1968 (Good) | 8400 |
| 856 diesel, 1968 (Good) | 7600 |
| 856, 1969 (Fair) | 4600* |
| 856, 1970 (Good) | 6000* |
| 966 diesel, 1974 (Fair) | 8800* |
| 966 diesel, 1976 (Fair) | 7000* |
| 966, 1972 (Rough) | 7600* |
| 986, 1979 (Excellent) | 13,400* |
| 1026, 1970 (Fair) | 6800* |
| 1066 diesel, 1975 (Good) | 6000 |
| 1066 diesel, 1977 (Good) | 8500 |
| 1066 diesel, 1974 (Good) | 8400 |
| 1066 diesel, 1975 (Fair) | 6900* |
| 1066 diesel, 1973 (Good) | 7200* |
| 1066, | 6600 |
| 1086 diesel, 1979 (Excellent) | 14,200 |
| 1086, | 13,700 |
| 1206, 1968 (Good) | 5150 |
| 1206 diesel, 1965 (Fair) | 5200* |
| 1206 diesel, 1963 (Rough) | 4475 |
| 1256 diesel, 1968 (Rough) | 3000 |
| 1456, 1967 (Good) | 7000* |
| 1456, 1969 (Rough) | 6400 |
| 1466, 1976 (Good) | 9400* |
| 1466, 1975 (Good) | 7450 |
| 1466, 1974 (Rough) | 5800* |
| 1486 diesel, 1979 (Good) | 15,000* |
| 1486, 1978 (Good) | 13,800* |
| 1486, 1980 (Good) | 12,500* |
| 1566, 1976 (Fair) | 9000* |
| 1568, 1973 (Good) | 6750* |
| 1586, 1980 (Excellent) | 14,000* |
| 1586, 1979 (Good) | 12,000* |
| 4166, 1974 (Good) | 8200* |
| 4568, 1976 (Fair) | 12,500 |
| 4386, 1976 (Good) | 12,500 |
| Sup. MTA, 1952 (Fair) | 1275 |

**MASSEY-HARRIS TRACTORS**

| | |
|---|---|
| 22, 1947 (Fair) | 350* |
| 33, | 650 |
| 444, 1955 (Fair) | 350 |
| Pacer, 1950 (Fair) | 650 |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| M-602, 1965 (Fair) | 1500 |
| M-670 diesel, (Fair) | 1700* |
| G-900, 1967 (Fair) | 3250* |
| G-1000, 1967 (Rough) | 2000 |

*(More...)*

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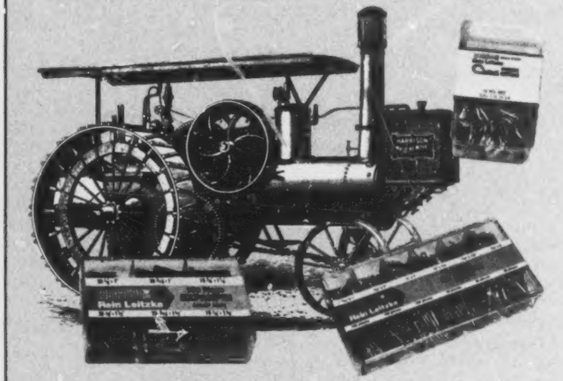

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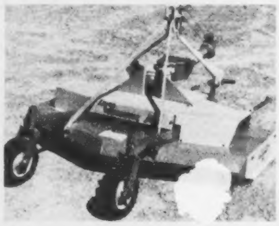

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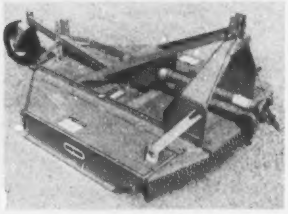

BIG OX 5' ROTARY CUTTER
A new line of heavy duty rotary cutters in 5', 6' and 7' models. Also available: V-Chisel Plow, Heavy Duty Rear Blades, Land Levelers, Stalk Choppers, Chisel Choppers, Harvest Wagon and Drill Hitches.

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## Auctions
*(continued)*

| | |
|---|---|
| UB diesel, 1950 (Fair) | 850* |
| U, 1950 (Fair) | 440* |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 990, 1970 (Fair) | 1425 |
| 1200, (Rough) | 3800 |
| 1210, 1975 (Fair) | 2150 |

**WHITE TRACTORS**

| | |
|---|---|
| 2-150 diesel, (Good) | 8500* |
| 2-150 diesel, (Good) | 6800* |
| 2-150 diesel, (Good) | 9400 |

**OLIVER TRACTORS**

| | |
|---|---|
| 77, 1954 (Rough) | 575 |
| 88, 1951 (Fair) | 625* |
| Sup. 66, 1951 (Fair) | 400 |
| 550, (Fair) | 1810 |
| 1250, (Fair) | 2300 |
| 1465 diesel, 1975 (Good) | 4800 |
| 1550, 1965 (Rough) | 2750 |
| 1600 diesel, 1967 (Fair) | 2600 |
| 1600, 1966 (Rough) | 1050 |
| 1650 diesel, 1965 (Rough) | 2900* |
| 1650 diesel, 1966 (Good) | 4150 |
| 1750 diesel, 1967 (Rough) | 2400* |
| 1800, 1962 (Fair) | 2500* |
| 1850, 1966 (Fair) | 3300 |
| 1850, 1966 (Fair) | 2900 |
| 1950, Turbo, 1967 (Rough) | 4200 |
| 1955 diesel, 1972 (Fair) | 4300* |
| 2255 diesel, cab, (Fair) | 7250* |

**CASE TRACTORS**

| | |
|---|---|
| 400, 1956 (Fair) | 750* |
| 4208, | 1700 |
| 430, 1966 (Good) | 2000 |
| 530, ldr., | 975 |
| 800 diesel, 1964 (Rough) | 1200* |
| 730, 1965 (Good) | 2250 |
| 830 diesel, 1965 (Fair) | 1875 |
| 830 diesel, 1965 (Fair) | 2500 |
| 930, 1965 (Fair) | 2500* |
| 930 diesel, 1964 (Fair) | 1300* |
| 930 diesel, 1965 (Rough) | 1450 |
| 1030 diesel, 1967 (Good) | 4050* |
| 1030 diesel, 1967 (Rough) | 3350 |
| 1070 diesel, 1972 (Fair) | 4975 |
| 1070 diesel, cab, (Good) | 5500 |
| 1070 diesel, cab, (Good) | 6100 |
| 1070 diesel, cab, (Good) | 8800 |
| 1170 diesel, cab, (Good) | 4800* |
| 1270 diesel, cab, (Rough) | 4200 |
| 1370 diesel, cab, (Fair) | 8750 |
| 1370 diesel, cab, (Rough) | 8250 |
| 1470 TK diesel, 1970 (Fair) | 5750* |
| 2090 diesel, 1979 (Good) | 16,500 |
| 2670 diesel, 1975 (Good) | 15,200* |

**STEIGER TRACTOR**

| | |
|---|---|
| Bearcat, 1975 (Good) | 7000* |

**FORD TRACTORS**

| | |
|---|---|
| 8N, 1951 (Fair) | 1150 |
| 8N, ldr., 1951 (Fair) | 1300 |
| 8N, 1952 (Fair) | 1150 |
| 8N, 1950 (Fair) | 975 |
| 8N, 1952 (Good) | 1320 |
| 8N, 1951 (Fair) | 1370 |
| 600, 1951 (Fair) | 1450* |
| 600, 1955 (Rough) | 1385 |
| 2000 diesel, (Fair) | 1950 |
| 4000, 1975 (Good) | 4200 |
| 4000, 1973 (Fair) | 1875 |
| 4000, 1970 (Rough) | 2900 |
| 4000, 1971 (Rough) | 2050 |
| 5000, | 4000 |
| 5000, 1974 (Good) | 2925* |
| 6000, 1963 (Rough) | 1050 |
| TW-30 diesel, 1961 | 9400* |
| 960, 1956 (Good) | 1525 |
| Maj. diesel, 1948 (Fair) | 1500* |
| Jub., 1953 (Fair) | 1875* |
| Jub., 1953 (Rough) | 1500 |
| 861 diesel, 1956 (Fair) | 2175 |

Calcium and Liquid Ballast Pump

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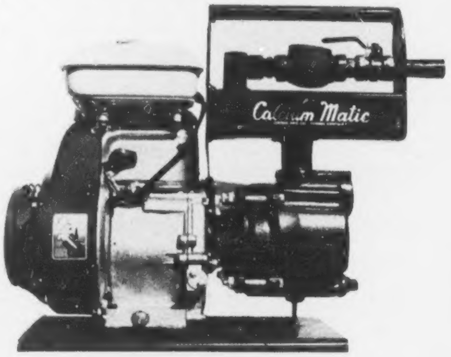

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### COCKSHUTT TRACTOR

| | |
|---|---|
| 540, 1956 (Fair) | 750* |

### JOHN DEERE TRACTORS

| | |
|---|---|
| A, ldr., | 325 |
| A, 1949 (Rough) | 475 |
| B, 1945 (Fair) | 750 |
| MT, ldr., | 825 |
| 50, 1953 (Good) | 1300 |
| 40, 1948 (Fair) | 800* |
| 60, 1955 (Good) | 1100 |
| 60, 1955 (Rough) | 820* |
| 70, 1958 (Fair) | 775 |
| 70, | 550 |
| 70 diesel, 1956 (Fair) | 1025* |
| 70, 1954 (Fair) | 1100* |
| 420, 1958 (Rough) | 1175* |
| 420, 1959 (Fair) | 1150 |
| 620, 1954 (Fair) | 1950* |
| 310 hoe/ldr., | 11,900 |
| 720 diesel, 1959 (Fair) | 1800 |
| 720 diesel, 1957 (Rough) | 1300 |
| 720, 1958 (Rough) | 1200* |
| 730 diesel, 1960 (Fair) | 1475 |
| 730 diesel, (Fair) | 2650* |
| 820 diesel, 1957 (Fair) | 2200* |
| 1010, cult., (Fair) | 2525 |
| 2010, 1962 (Fair) | 2000 |
| 2010, 1963 (Good) | 2800 |
| 2020, 1972 (Fair) | 3400* |
| 2020, ldr., | 2900 |
| 2510, 1971 (Fair) | 3700 |
| 2510, 1967 (Good) | 3500 |
| 2840, | 6950 |
| 3010, 1963 (Fair) | 2800 |
| 3010 diesel, 1969 (Fair) | 5100 |
| 3020 diesel, 1969 (Fair) | 3550 |
| 3020 diesel, 1966 (Good) | 5400* |
| 3020 diesel, | 3700 |
| 3020, 1966 (Good) | 3550 |
| 4000, 1970 (Good) | 6200 |
| 4010 diesel, | 4200 |
| 4010, 1962 (Fair) | 2900* |
| 4010, 1964 (Rough) | 2850 |
| 4010 diesel, | 4950 |
| 4010, 1964 (Fair) | 3600* |
| 4020 diesel, 1968 (Good) | 7000 |
| 4020 diesel, 1966 (Fair) | 5675 |
| 4020 diesel, 1968 (Good) | 6250* |
| 4020, 1969 (Good) | 5200* |
| 4020 diesel, 1967 (Rough) | 3050 |
| 4020 diesel, | 6800 |
| 4020 diesel, | 5850 |
| 4230 diesel, 1974 (Good) | 12,000* |
| 4230, | 11,000 |
| 4320 diesel, 19[illegible] (Good) | 8400 |
| 4320 diesel, 1972 (Excellent) | 9300 |
| 4430 diesel, 1973 (Good) | 10,200 |
| 4430, cab, (Good) | 13,000 |
| 4430 diesel, 1974 (Good) | 8400 |
| 4430 diesel, 1975 (Good) | 11,800* |
| 4430, 1976 (Excellent) | 14,900* |
| 4440, 1982 (Good) | 27,000* |
| 4520 diesel, 1970 (Fair) | 4900* |
| 4620 diesel, 1970 (Fair) | 6000* |
| 4620 diesel, | 8000 |
| 4620 diesel, 1971 (Good) | 8250* |
| 4620 diesel, 1972 (Fair) | 6200* |
| 5020, cab, 1968 (Rough) | 4800* |
| 5020 diesel, 1967 (Fair) | 4400* |
| 5020 diesel, | 5450 |
| 6030, 1976 (Fair) | 12,300* |
| 8430, 1977 (Good) | 22,000 |
| Jub., | 1500 |
| 2130 diesel, 1974 (Fair) | 4500* |

### FERGUSON & MASSEY-FERGUSON TRACTORS

| | |
|---|---|
| TO-20, 1953 (Fair) | 925 |
| TO-20, 1951 (Rough) | 1125* |
| TO-30, 1951 (Rough) | 1175* |
| 40, | 3175 |
| 35 diesel, 1959 (Rough) | 1250* |
| 50, 1960 (Fair) | 1900 |
| 50, ldr., (Fair) | 2050 |
| 65, ldr., (Fair) | 2325 |
| 65, cult., (Fair) | 1600* |
| 65, 1962 (Fair) | 1700 |
| 90, 1964 (Fair) | 2000* |
| 165, 1948 (Fair) | 3100* |
| 180, 1969 (Fair) | 3250 |
| 235 diesel, 1979 (Good) | 4500 |
| 245 orchard, (Good) | 5000 |
| 275 diesel, 1979 (Good) | 6750* |
| 1080 diesel, 1968 (Fair) | 4200* |
| 1100, 1967 (Good) | 4075 |
| 1105 diesel, cab, | 8500 |
| 1130 diesel, | 4190 |
| 1130 diesel, cab, | 4100* |
| 1130 diesel, cab, | 4600 |
| 1150 diesel, 1970 (Rough) | 5740* |
| 1150 diesel, cab, | 5200 |
| 1155 diesel, cab, | 9250* |

### ALLIS-CHALMERS TRACTORS

| | |
|---|---|
| B, 1946 (Fair) | 500 |
| C, | 550 |
| CA, 1950 (Fair) | 875 |
| G, 1950 (Fair) | 900 |
| G, 1950 (Fair) | 1025 |
| U, 1964 (Good) | 4150 |
| WD-45, 1953 (Good) | 1125 |
| D-14, 1965 (Good) | 1050 |
| D-19, 1960 (Good) | 1575 |
| WD-19, 1960 (Fair) | 1875 |
| 190XT, 1969 (Fair) | 2275 |
| 190XT diesel, 1967 (Rough) | 2900 |
| 190XT, 1971 (Good) | 5600* |
| 190XT diesel, 1971 (Good) | 2800 |
| 190XT diesel, 1971 (Fair) | 4000 |
| 200, 1970 (Good) | 6000* |
| 200 diesel, | 7000 |
| 220 diesel, 1974 (Rough) | 2650 |
| 220, 1969 (Rough) | 4500 |
| 160 diesel, 1970 (Rough) | 3700* |
| 7080 diesel, 1975 (Rough) | 10,750* |

---

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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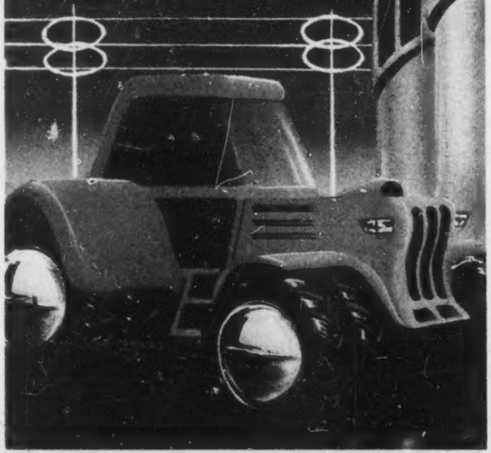

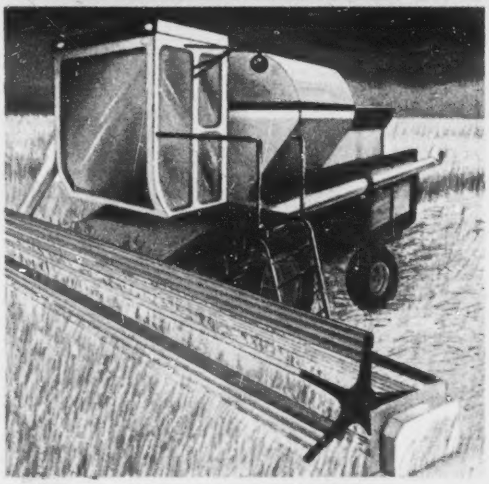

Circle (18) on Reply Card

## Sales Forecast *(Continued from page 22)*

- **"Draw-down** of grain stocks; rebounding farm equipment sales; lower field inventory of farm equipment...."
- **"Upward trend** after two years of PIK. Reduced new unit sales even below 1981-82 level until then."
- **"Increased volatility** in sales. Expect sharp gains in 1984 or 1985. Greater reliance on government programs."
- **"Paramount** will be general world climatic conditions and national and international economic factors....Improvement in demand for equipment occurring in the second half of 1984, continuing the next few years."
- **"Many firms** that have heavy debt will fail. There is generally excess manufacturing capacity that will not be needed in the foreseeable future...."
- **"Substantial set-asides** create greater potential for more volatile markets as reduced yield could change supply/demand and prices; further delays in buying plans create an increase in latent demand. Set-asides will increase demand for some other types of equipment—haying, sprayers...."
- **"Possible extension** of PIK into dairy area to handle surplus products."
- **"More effort to cut** time lag between equipment production and purchase. More efforts to develop creative financing plans for equipment buyers...."

**How that forecast is developed**

It may be old ground for some readers, but others may welcome an explanation of how those forecast figures are determined.

1. Survey forms go from the FIEI to member firms' marketing executives.
2. Executives participate in terms of listed products their firms market. Respondents indicate percentage of change, up or down, they expect for each product during the indicated year, compared with the previous year, usually in terms of units.
3. FIEI asks respondents to estimate in terms of the whole U.S. and the industry, not just predominant areas or their individual companies. (But some have told I&T they estimate in terms of their own companies and give the numbers some measure of optimistic cast.)
4. Responses are tallied. The median percentage figure is established as the consensus forecast for the individual product.
5. Percentages are converted in unit numbers, based on the previous year's sales data.
6. The resulting "State of the Industry" report is given at the twice-yearly Marketing & Management Conference. The current reporter is Peter Perkins (FMC Corp.).

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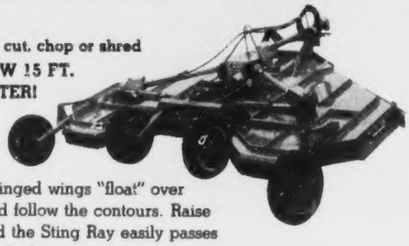

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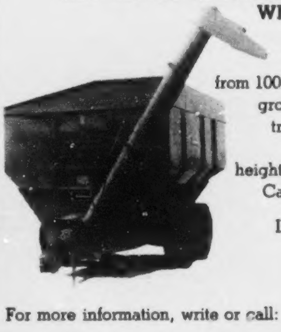

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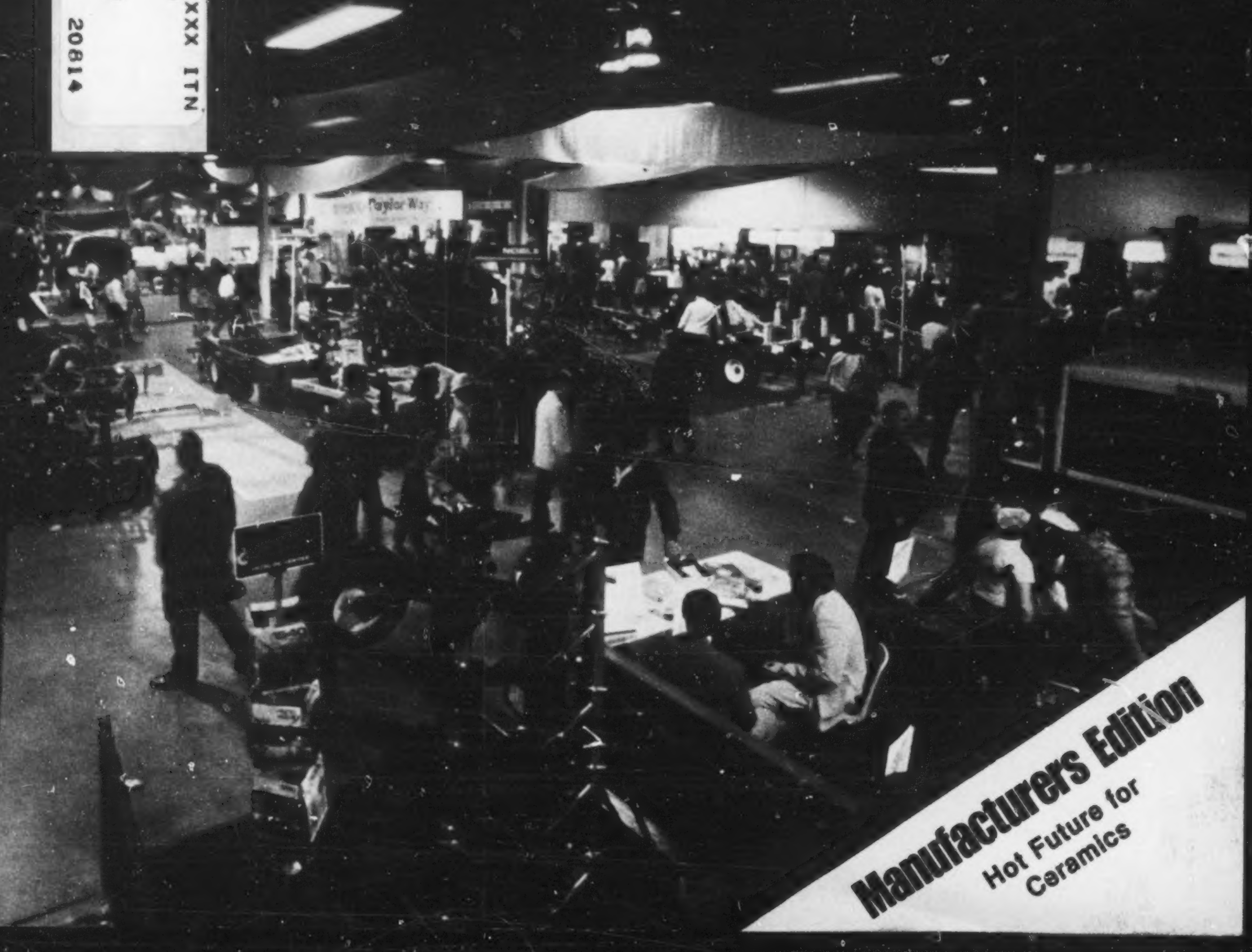
## 3–1984 FARM EQUIPMENT SHOWS, CONVENTIONS, MEETINGS

Complete listings start on page 7



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INTERTEC PUBLISHING CORP.

# Implement &Tractor

*The business magazine of the farm & industrial equipment industry*

July 1983 • Vol. 98 • No. 9

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page 30

**7: Conventions, Shows and Fairs, 1983-1984.** Our annual listing of the industry's most important gatherings in North America and overseas.

**10: Getting the Cash Takes Push.** Sales veteran Walt Buescher reflects on a problem dealers have faced for decades: Do farmers charge at your place, then stay away out of embarrassment?

**14: How This Computer is Paying Off.** By spotting cost savings on parts purchases, the in-house electronic brain is earning its keep at Rohde-Sons.

**18: View From the Salvage Yard.** The used/reconditioned parts business offers a special perspective of the farm tractor industry.

**24: How Power Tools Differ.** A quick reference on the features that separate professional from consumer-grade electrical power tools.

**26: Two Auctions – Volume is Up, But It's Still a Buyer's Market.** A look at how the bidding went at two recent farm equipment auctions.

**30: The Seventies Are Over.** Experts analyze the conditions facing the ag industry in the 1980s at the FIEI Spring Marketing & Management Conference.

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**On the cover...**scene from the National Farm Machinery Show, Louisville, Ky.

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# I&T Update

## May Produces More Plus Signs!

The upturn in unit sales that has been talked about for several months began to make itself felt in the May flash report of the Farm & Industrial Equipment Institute. All four power categories of two-wheel-drive tractors showed improvement over May, 1982, and even the four-wheelers had a softer decline than in recent months.

Hay tools continue to show improvement. The combine decline that had been anticipated, after midwinter increases, is becoming pronounced. The flash report:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | May | | | January-May | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| **Farm Wheel Tractors:** | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 5,380 | 5,376 | +.1 | 19,658 | 19,791 | ( .7) |
| 40-100 hp | 3,749 | 3,472 | + 8.0 | 15,627 | 17,579 | (11.1) |
| 100-140 hp | 1,412 | 1,144 | +23.4 | 6,677 | 8,990 | (25.7) |
| Over 140 hp | 1,295 | 652 | +98.6 | 4,995 | 4,909 | + 1.8 |
| **Total 2-wheel drive** | **11,836** | **10,644** | **+11.2** | **46,957** | **51,269** | **( 8.4)** |
| 4-wheel drive | | | | | | |
| Under 200 hp | 154 | 248 | (37.9) | 764 | 1,631 | (53.2) |
| Over 200 hp | 261 | 309 | (15.5) | 1,018 | 1,631 | (37.6) |
| **Total 4-wheel drive** | **415** | **557** | **(25.5)** | **1,782** | **3,262** | **(45.4)** |
| **Total All Tractors** | **12,251** | **11,201** | **+ 9.4** | **48,739** | **54,591** | **(10.6)** |
| S-P Combines | 359 | 597 | (39.9) | 4,004 | 3,557 | +12.6 |
| Balers (200-lb. bales) | 761 | 671 | +13.4 | 2,497 | 1,963 | +27.2 |
| Forage Harvesters (Shear-bar type) | 243 | 256 | ( 5.1) | 869 | 1,053 | (17.5) |
| Mower-Conditioners | 1,417 | 1,403 | + 1.0 | 4,018 | 3,590 | +11.9 |

## Inventories Moving Down, But Slowly

Inventories of tractors and combines as of April 30, according to the Farm & Industrial Equipment Institute, were running under levels of a year earlier.

Supplies of tractors over 40 hp were down 10.7 per cent, compared with 12 months earlier, at 70,502 units. However, sales through the first four months of 1983 were off over 20 per cent. For tractors under 40 hp, 1982 numbers are not available.

Inventories of self-propelled combines were off 14 per cent as of April 30 at 13,900 units.

## If Your Gleaner's Oldest, Will You *Want* the Prize?

Noting that Gleaner combines came on the market 60 years ago, Allis-Chalmers is conducting a search for the oldest *working* Gleaner. Once this is established, A-C intends to fly the winner (the owner, actually, not the machine) to Kansas City for a weekend holiday, which will include a Kansas City Chiefs football game and a tour of the Gleaner plant in Independence, Mo. If it happens to be the Chiefs vs. Green Bay, those A-C executives from Milwaukee will expect the honored Gleaner owner to boo the home team (which is only what the local ticket buyers do, anyway). Here's what a vintage Gleaner looks like.

## Briefly....

**Smiling shortliners:** A select survey of Farm Equipment Manufacturers Assn. members indicates that 84 per cent currently have increased orders on their books for the first time in over two years. "It's a real trend," according to Harold Halter, executive vice-president. He also noted that FEMA had shipped an unusually large number of "Seal of Quality" decals—affixed by participating members on each unit—a sign of increased production/shipment activity.

**Massey-Ferguson's** first quarter, ended April 30, produced a net loss of $17.9 million, compared with a $25.7 million loss in the same period of 1982. Sales were $403 million, down from $558 million. North American sales were $117 million, a 21 per cent decline. MF reported that receivables of $560 million were down by $287 million and inventories of $577 million were down $277 million from a year ago. The company claimed improved retail market share of tractors and combines in all major markets.

**Deere & Co.** reported a 1983 second quarter net loss of $11.3 million and a six-month loss of $39.8 million. A year earlier, earnings were $3 million for the quarter and $36.7 million for the first half. Second quarter worldwide sales were $1.01 billion ($1.25 billion in 1982); first-half volume was $1.87 billion ($2.31 billion in 1982). Trade receivables as of April 30 were $2.95 billion compared with $2.81 billion a year before.

**A receivership** has been set up in Canada for White Farm Equipment Ltd., Brantford, Ont., a subsidiary of TIC Investment Corp. but a separate company from White Farm Equipment Co. Carl McNair, marketing vice-president of White (U.S.), said that combines for 1983 were built before the Brantford plant was shut down last year and that parts are in sufficient supply.

**International Harvester:** First-half farm equipment sales were down 28 per cent from $918 million in 1982 to $662 million. Second quarter sales were $410 million, down 27 per cent. Farm equipment market share for IH is about even with last year, the company states.

# Farm Bill Perspective

**Richard E. Lyng,** deputy secretary of agriculture: "If there is a PIK in 1984, it will be different. There will almost certainly be a PIK on other products....The 1981 Farm Act was based on 1970s experience. The dollar was weaker, there was greater concern about world food shortages, the 1980 USDA outlook conference focused on shortages, there was world drought concern. So much in the 1981 Act was wrong. Supports and target prices were wrong; they didn't allow market to clear. There was no expectation that the dollar would be priced so high against other currencies....We must make the U.S. more competitive. We needn't be protectionist if we can move in a free market." I&T

## Auctions *(Continued from page 28)*

**WHITE TRACTORS**

| | |
|---|---|
| 2-150 diesel, 1978 (Fair) | 8700* |
| 2-150, 1978 (Good) | 6500* |
| 2-150, 1977 (Good) | 9900* |
| 1470, (Good) | 5000* |

**COCKSHUTT TRACTORS**

| | |
|---|---|
| 540, (Fair) | 1200 |
| 1555 diesel, 1968 (Fair) | 2000* |

**OLIVER TRACTORS**

| | |
|---|---|
| 77, 1950 (Fair) | 475 |
| 88, 1951 (Good) | 575* |
| 1250, 1965 (Fair) | 1100* |
| 1600, 1961 (Fair) | 2100 |
| 1600, 1962 (Fair) | 1575 |
| 1650 diesel, 1967 (Good) | 2950 |
| 1650 diesel, 1967 (Fair) | 3850* |
| 1650, 1968 (Good) | 4800 |
| 1655, (Fair) | 3500* |
| 1750, 1967 (Fair) | 2750 |
| 1800, 1962 (Fair) | 1900* |
| 1850, 1967 (Rough) | 2800 |
| 1855, 1971 (Good) | 4000 |
| 1950 diesel, | 4000 |
| 2050, 1970 (Good) | 5450 |
| 2150, (Fair) | 5250* |
| Sup. 66, 1950 (Fair) | 725 |

**FERGUSON & MASSEY FERGUSON**

| | |
|---|---|
| TD-20, ldr., | 1500 |
| TD-20, | 1000 |
| YF-30, 1950 (Good) | 1075 |
| 35 diesel, 1961 (Fair) | 2000* |
| 65 diesel, 1962 (Fair) | 2250* |
| 65 diesel, 1959 (Rough) | 2600 |
| 65, 1963 (Fair) | 1250 |
| Sup. 90 diesel, 1962 (Rough) | 1200* |
| 135 diesel, | 3000 |
| 135, 1969 (Good) | 3900 |
| 135 diesel, 1968 (Fair) | 3050 |
| 165 diesel, 1972 (Good) | 3750 |
| 175 diesel, | 3300 |
| 1105 diesel, 1977 (Fair) | 6425* |
| 2675, | 10,900 |
| 200, ldr., | 775 |

**CASE TRACTORS**

| | |
|---|---|
| DC, | 650 |
| 310 crawler ldr., | 2200 |
| 530, | 4500 |
| 530 ldr., | 850 |
| 530, | 2800* |
| 830 diesel, 1965 (Rough) | 900* |
| 830, 1967 (Good) | 2900 |
| 870 diesel, 1971 (Good) | 5550 |
| 1170, 1970 (Fair) | 5000* |
| 1175 diesel, 1973 (Fair) | 6200 |
| 1370 diesel, 1973 (Fair) | 7800 |
| 1370, 1973 (Fair) | 5050 |
| 1470, 1965 (Fair) | 5200* |
| 1570 diesel, 1977 (Good) | 12,250* |
| 2470, 1975 (Good) | 10,900 |
| 1740, (Fair) | 6250* |

**NOTES:**

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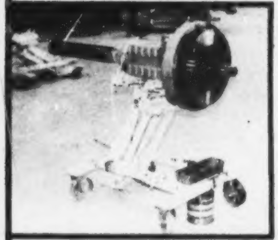

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August 1983

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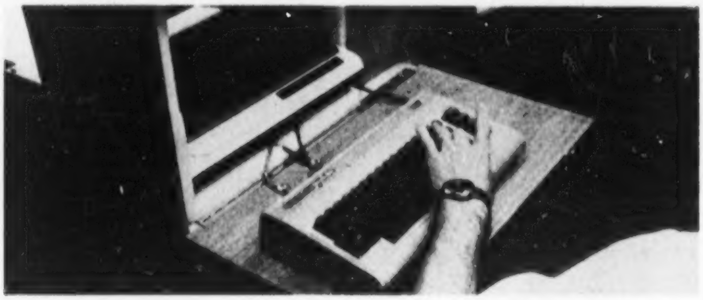

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**8:** **Getting a Fix on Reliability/Availability.** Is the farmer better off keeping backup equipment, or upgrading the reliability level of his operation by buying newer machines?

**11:** **Selling Equipment With a Personal Computer.** Jerry Johnson used his own computer to sell machinery, and now offers the system to other dealers.

**13:** **Shop Profit Leaks: Improved, But Still Bad.** A study finds that dealers' shops are still losing money, though not as badly as in the past.

**16:** **There's Money Below the Line.** Some dealers just fill orders, while others sell – Dealer Gary Witherspoon knows the difference.

**20:** **Seeking the Year of the Four-Eyed Tiger.** A look at SAME as the Italian tractor builder readies a new push into the U.S. market.

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**On the cover...**Gary Witherspoon warms up to sell below the line.

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# Update

## June Numbers: Rebound Continues in Most Groups

Unit sales of two-wheel-drive tractors in June showed the most strength in the bottom (under 40) and top (140 and over) horsepower ranges, according to the Farm & Industrial Equipment Institute's monthly flash report.

While unit sales of farm wheel tractors are now within a few percentage points of the 1982 level and apparently headed upward, combine volume is tailing off substantially. Hay tool sales numbers are strong.

The flash report:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | June | | | January-June | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| **Farm Wheel Tractors:** | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 6,774 | 4,831 | +40.2 | 26,627 | 24,622 | + 8.1 |
| 40-100 hp | 5,013 | 4,088 | +22.6 | 20,580 | 21,667 | ( 5.0) |
| 100-140 hp | 1,414 | 1,423 | ( 0.6) | 8,085 | 10,413 | (22.4) |
| Over 140 hp | 1,075 | 694 | +54.9 | 6,073 | 5,603 | + 8.4 |
| **Total 2-wheel drive** | **14,276** | **11,036** | **+29.4** | **61,365** | **62,305** | **( 1.5)** |
| 4-wheel drive | | | | | | |
| Under 200 hp | 199 | 202 | ( 1.5) | 963 | 1,833 | (47.5) |
| Over 200 hp | 265 | 285 | ( 7.0) | 1,284 | 1,916 | (33.0) |
| **Total 4-wheel drive** | **464** | **487** | **( 4.7)** | **2,247** | **3,749** | **(40.1)** |
| **Total All Tractors** | **14,740** | **11,523** | **+27.9** | **63,612** | **66,054** | **( 3.7)** |
| S-P Combines | 506 | 1,091 | (53.6) | 4,510 | 4,648 | ( 3.0) |
| Balers (200-lb. bales) | 2,021 | 1,818 | +11.2 | 4,518 | 3,781 | +19.5 |
| Forage Harvesters (Shear-bar type) | 556 | 584 | ( 4.8) | 1,424 | 1,637 | (13.0) |
| Mower-Conditioners | 3,964 | 3,522 | +12.5 | 7,983 | 7,112 | +12.2 |

## A-C's Deal: Order Ahead, Wait, Save About 9%

There's more than a typical "red tag" sale involved in the new Allis-Chalmers promotion, which offers buyers a 9 per cent price cut on a special "LTD" version of the Gleaner N6 rotary combine.

Buyers must order in advance, then wait for the factory to build and ship the unit—typically within 30 to 60 days.

Tom Stadtmueller, A-C combine marketing manager, says the plan cuts out dealer floor plan and storage costs that develop when the "in-stock" combine sits four to eight months before being sold. Dealer margin as a per cent of suggested list on the LTD remains the same as with other combine models, he says.

For $99,763 (less header) the customer gets a well-dressed N6, with power feed reverser, cooled-and-heated cab, and other major performance and comfort items.

Roger Roy, manufacturing manager at the Independence, Mo., Gleaner plant, says that some money is saved by batch-building a large group of identical LTD combines, rather than having to tailor-make each unit on the line.

"If this works out, we'll look at extending the same order-and-wait terms to other lines," says Stadtmueller. "My gut feeling is we're on to something good." He notes that eight combines were sold in the first two weeks of July, right after dealers got details of the offer.

## Harriott Heads ASAE; MSU's Anderson Is President-Elect

Bill L. Harriott, a research and development consultant from Sunnyvale, Calif., took over as president of the American Society of Agricultural Engineers at its June 26-29 convention at Bozeman, Mont. Gerald Isaacs (U. of Florida) had held the post.

President-elect, who is scheduled to assume the presidency of ASAE in June, 1984, is James H. Anderson, Michigan State U.'s dean of the College of Agriculture.

Harriott worked as an engineer for International Harvester and then Deere & Co., was on the U. of Arizona faculty for 10 years and was a research consultant for FMC Corp. from 1974 to 1983.

The title of Fellow, a major distinction conferred on few ag engineers, was given to Donnell R. Hunt (U. of Illinois) and Ralph E. Baumheckel (Farmhand Inc. and formerly International Harvester.

## Brighter Inventory Picture as of May 31 On Most Products

Farm tractor inventories as of May 31 appeared to be in a healthier position than they were a year earlier. On May 31, 1982, there were 80,372 units (40 hp and over) on hand, with unit volume sales on a downward trend. A year later, there were 68,516 such units in stock with sales volume moving up.

Sales and inventories of tractors under 40 hp were not reported a year ago. As of May 31 this year, 38,988 of the under-40-hp models were on hand as sales moved up strongly.

Inventories of self-propelled combines as of May 31 were 15,164, down from the 17,620 of a year before, but sales volume in the second quarter of 1983 was softening rapidly.

Inventories of balers (bales under 200 lbs.) were down substantially from the end of May, 1982—from 15,967 units to 11,742—while retail sales through most of 1983 were moving up. Mower-conditioners, also posting 1983 sales increases, had an improved inventory position—18,304 units on hand May 31 compared with 20,972 a year before.

(Source: Farm & Industrial Equipment Institute.)

## Hesston: Profit Improvement in Second Quarter

Hesston Corp. earned $6.9 million in its second quarter on sales of $63.8 million, bringing first-half earnings to $2 million on sales of $101.4 million.

Last year's second quarter earnings were $3.08 million on sales of $72.6 million; first-half, 1982, earnings were $404,000 on sales of $121 million after deducting 1982 results of its French subsidiary (sold last year to a subsidiary of Fiat Trattori), which is Hesston's majority owner.

Howard Brenneman, Hesston president, said performance of the Woods Div. (mowers, rotary cutters) paced the earnings improvement and that sales of Hesston (Fiat) tractors and the Woods line topped expectations. He said Hesston may break even in 1983.

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# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## YODER & FREY, INC.
## Archbold, Ohio
## June 14, 1983

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| M-602, 1964 (Fair) | 2300* |
| M-670 (Fair) | 2700* |
| M-670, (Fair) | 1400* |
| 705 diesel, (Fair) | 1950* |
| G-707 diesel, 1964 | 1900* |
| G-1000 diesel, 1967 (Fair) | 4050 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| A, | 380 |
| A, | 285 |
| G, | 360 |
| 40, 1955 (Fair) | 850* |
| 60, 1954 (Rough) | 675* |
| 430, 1958 (Fair) | 1800* |
| 730 diesel, 1957 | 2750 |
| 730 diesel, 1960 (Fair) | 1350* |
| 820 diesel, 1956 (Fair) | 1850 |
| 1010, 1962 (Rough) | 1400* |
| 1520, (Fair) | 4375 |
| 2010, 1964 (Rough) | 2525 |
| 2010, | 1475 |
| 2030 diesel, 1974 (Rough) | 3800* |
| 2510, 1969 (Good) | 3550* |
| 2510, 1970 (Good) | 4200* |
| 2840, (Fair) | 9200* |
| 3020, 1966 (Rough) | 3300* |
| 4010 diesel, 1964 (Fair) | 4250 |
| 4620 diesel, 1970 (Excellent) | 8000* |
| 4620 diesel, 1974 (Fair) | 5100* |
| 5020 diesel, | 4100 |
| 5020 diesel, | 2850 |

**OLIVER TRACTORS**

| | |
|---|---|
| 77, 1948 (Rough) | 800 |
| 88 diesel, 1950 (Fair) | 625* |
| 660, 1959 (Fair) | 1025 |
| 1650, 1967 (Fair) | 4800* |
| 1650, 1966 (Fair) | 2200 |
| 1750, 1965 (Fair) | 2750* |
| 1750 diesel, 1966 (Good) | 3350 |
| 1800 diesel, 1961 (Rough) | 1925* |
| 1800, 1962 (Fair) | 1900* |
| 1850 diesel, 1966 (Fair) | 3500 |
| 1855 diesel, 1969 (Fair) | 4900* |
| 1950-turbo, 1968 (Good) | 4700 |
| 1955 diesel, 1973 (Fair) | 5200* |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 1200 diesel | 2375 |
| 1200 diesel, | 2550 |

**DEUTZ TRACTOR**

| | |
|---|---|
| 60-06, | 4700 |

**MASSEY-HARRIS TRACTOR**

| | |
|---|---|
| 444, 1954 (Fair) | 600* |

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| C, 1950 (Fair) | 525 |
| CA, | 775 |
| G, 1950 (Fair) | 850 |
| D-15, 1967 (Fair) | 3300 |
| D-17, 1967 (Fair) | 3050* |
| D-17, 1966 (Fair) | 1500 |
| 190XT diesel, 1970 (Good) | 3750 |
| 200 diesel, 1974 (Good) | 6750* |
| 220, 1968 (Rough) | 4000* |
| 7040, 1975 (Fair) | 5250 |
| 7060, 1974 (Good) | 8900 |

**FERGUSON & MASSEY FERGUSON**

| | |
|---|---|
| TD-20, 1946 (Fair) | 1050 |
| 20, 1945 (Fair) | 1450 |
| 35 diesel, 1958 (Rough) | 1950 |
| 35 diesel, 1958 (Rough) | 1600 |
| 65 diesel, 1957 (Rough) | 1250* |
| 65, 1959 (Fair) | 1500 |
| 65, 1959 (Fair) | 1700* |
| 65 diesel, 1960 (Fair) | 1875 |
| 165, 1971 (Good) | 3450* |
| 165 diesel, 1970 (Good) | 3500* |
| 165 diesel, 1969 (Fair) | 4450* |
| 165 diesel, 1969 (Good) | 3450 |
| 165, 1970 (Good) | 4600* |
| 180, 1967 (Fair) | 2800 |
| 235, 1977 (Rough) | 4800* |
| 255, 1978 (Fair) | 5500 |
| Sup. 90 diesel, 1964 (Rough) | 925* |
| 1150, | 5000 |

**FORD TRACTORS**

| | |
|---|---|
| 8N, 1946 (Rough) | 1000 |
| 8N, 1952 (Good) | 1800 |
| 800, 1956 (Fair) | 2275* |
| 600 diesel, | 1050 |
| 3000 diesel, 1968 (Fair) | 3200 |
| 3000 diesel, 1972 (Fair) | 3550 |
| 3000 diesel, 1970 (Fair) | 3200* |
| 3000, 1968 (Rough) | 2925 |
| 4000, (Fair) | 2250* |
| 4000, 1963 (Good) | 3350 |
| 5000 diesel, 1967 (Fair) | 3500* |
| 5000 diesel, 1968 (Rough) | 3150* |
| 5000 diesel, 1970 (Rough) | 2100* |
| 5000 diesel, 1972 (Fair) | 4250* |
| 5000, 1971 (Fair) | 4300 |
| 6600 diesel, (New) | 9100* |
| 6600, 1977 (Fair) | 6700* |
| 7000, 1975 (Rough) | 3950 |
| 971, 1962 (Good) | 1300 |
| NAA, 1953 (Fair) | 6100* |

**WHITE TRACTOR**

| | |
|---|---|
| 2-150 diesel, 1977 (Fair) | 7300* |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| Sup. MTA, 1952 (Rough) | 925* |
| A, 1945 (Fair) | 875* |
| Cub, 1948 (Rough) | 1375 |
| Cub, 1946 (Rough) | 1375 |
| Cub, 1952 (Fair) | 1500* |
| Cub, | 1950 |
| Cub, 1950 (Fair) | 1450 |
| Cub Lo-Boy, (Rough) | 1100* |
| 154 Lo-Boy, (Fair) | 2400 |
| M, 1951 (Fair) | 800 |
| M, 1947 (Fair) | 625 |
| M, 1942 (Rough) | 625 |
| M, 1948 (Rough) | 525 |
| M, 1943 (Fair) | 700* |
| M, 1950 (Rough) | 675 |
| M, 1945 (Rough) | 425* |
| Sup. M, 1951 (Rough) | 500* |
| 100, 1955 (Fair) | 1650 |
| 130, | 2000 |
| 140, | 2200 |
| 230, 1963 (Fair) | 1800* |
| 300, 1956 (Fair) | 1400 |
| 350, | 875 |
| 454 diesel, (Fair) | 3200* |
| 460, 1962 (Fair) | 1500 |
| 560, 1961 (Fair) | 1200 |
| 560, 1959 (Fair) | 1525 |
| 560, 1960 (Fair) | 1650* |
| 666, 1975 (Good) | 5900* |
| 706, 1967 (Fair) | 2800* |
| 706, 1965 (Fair) | 2300* |
| 806 diesel, 1965 (Fair) | 4600 |
| 806 diesel, 1964 (Fair) | 4700 |
| 826, (Rough) | 5250* |
| 856, 1969 (Fair) | 5000 |
| 966, 1974 (Fair) | 7000* |
| 966 diesel, 1972 (Rough) | 7100* |
| 1026, 1970 (Fair) | 5700* |
| 1086, 1980 (Excellent) | 13,500* |
| 1206 diesel, 1965 (Fair) | 5000 |
| 1256 diesel, 1968 (Good) | 6100* |
| 1466 diesel, 1976 (Fair) | 7550 |
| 1486, 1979 (Excellent) | 14,500* |
| 1568, (Excellent) | 17,500 |
| Sup. C, | 650 |

**CASE TRACTORS**

| | |
|---|---|
| 530, | 2500 |
| 580, | 4000 |
| 580, | 5300* |
| 580, | 5350 |
| 830 diesel, | 725 |
| 930 diesel, 1967 (Fair) | 3100* |
| 930, 1966 (Good) | 3650 |
| 1030, (Fair) | 3625 |
| 1070, 1972 (Fair) | 6100* |
| SC, 1945 (Rough) | 250 |
| DC, 1946 (Rough) | 350* |

## JONES FARM EQUIPMENT CO.
## Dothan, Alabama
## June 14, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| 7000 diesel, 1975 (Good) | 7000 |
| D14, ldr., 1958 (Good) | 1600 |
| D12, cult., 1961 (Fair) | 600 |

**CASE TRACTOR**

| | |
|---|---|
| 1370 diesel, duals, 1976 (Excellent) | 7800 |

**DAVID BROWN TRACTOR**

| | |
|---|---|
| 990 diesel, ldr., 1965 (Fair) | 1200 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 5020 diesel, duals, 1967 (Fair) | 4500* |
| 4430 diesel, duals, 1975 (Excellent) | 9200 |
| 4030 diesel, 1976 (Excellent) | 8900 |
| 4020 diesel, 1969 (Good) | 4850 |
| 2640 diesel, 1978 (Excellent) | 7800* |
| 2630 diesel, 1975 (Good) | 4850 |
| 2010, 1963 (Good) | 1800 |
| 1530 diesel, 1975 (Excellent) | 5200 |

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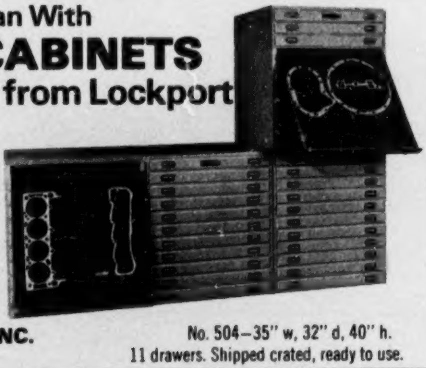

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|---|---|
| 1120 diesel, (Good) | 2700 |
| 1020 diesel, 1968 (Good) | 3000 |
| 950 diesel, 1980 (Excellent) | 5300 |
| 850 diesel, 1979 (Excellent) | 6000 |
| 820 diesel, 1974 (Good) | 2500* |
| 544 diesel, ldr., 1969 (Excellent) | 9000 |
| 420, 1956 (Good) | 800* |
| 420, 1956 (Fair) | 725 |
| 40, 1955 (Excellent) | 1150 |
| 40, 1955 (Good) | 850 |
| A, 1946 (Rough) | 175 |

**FORD-FERGUSON TRACTORS**

| | |
|---|---|
| 9N, 1947 (Good) | 900 |
| 9N, 1946 (Good) | 800 |
| 9N, 1944 (Rough) | 375 |

**FORD TRACTORS**

| | |
|---|---|
| 9700 diesel, duals, 1977 (Good) | 9200 |
| 7000 diesel, 1973 (Good) | 5750 |
| 5000 diesel, 1976 (Fair) | 3750 |
| 5000 diesel, 1968 (Good) | 3750 |
| 5000 diesel, 1968 (Good) | 3900* |
| 4410 diesel, trencher, 1967 (Good) | 2700* |
| 4000 diesel, 1969 (Excellent) | 3800 |
| 4000 diesel, 1969 (Excellent) | 4300* |
| 4000 diesel, 1968 (Fair) | 2925 |
| 4000 diesel, 1968 (Good) | 3800 |
| 4000 diesel, 1968 (Good) | 2900* |
| 3500 diesel, ldr., 1969 (Fair) | 2150 |
| 3400 diesel, ldr., 1966 (Good) | 2900 |
| 3000 diesel, 1968 (Good) | 3300* |
| 3000 diesel, 1968 (Good) | 3100 |
| 3000 diesel, 1968 (Good) | 3100 |
| 3000 diesel, 1968 (Rough) | 1050 |
| 2000, 1963 (Rough) | 1050* |
| 2000, ldr., 1963 (Good) | 2550 |
| 850, 1956 (Good) | 2000 |
| Sup. Dex. 1963 (Good) | 1300 |
| Dexta, 1959 (Good) | 1275 |
| NAA, 1954 (Excellent) | 2000 |
| NAA, 1954 (Good) | 1625 |
| Jub., 1953 (Fair) | 1050 |
| Jub., 1953 (Good) | 1500 |
| 8N, 1952 (Good) | 1600* |
| 8N, 1948 (Fair) | 825 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| 1206 diesel, cab, duals, 1964 (Fair) | 3500 |
| 706 diesel, 1964 (Fair) | 3000 |
| 656 diesel, 1969 (Good) | 3950 |
| 656 diesel, 1967 (Rough) | 750 |
| 574 diesel, 1974 (Fair) | 3100* |
| 574 diesel, 1974 (Fair) | 2900 |
| 574 diesel, 1972 (Rough) | 2400 |
| 560 diesel, 1960 (Rough) | 1400* |
| 504 diesel, 1964 (Fair) | 1200 |
| 464 diesel, 1973 (Good) | 3900* |
| 454 diesel, 1973 (Good) | 2800* |
| 424, 1966 (Good) | 2100 |
| 424, 1965 (Good) | 2300 |
| B414 diesel, 1963 (Good) | 1250 |
| 300, 1956 (Rough) | 435 |
| Sup. A, 1953 (Good) | 1400 |
| Sup. A, 1953 (Good) | 1300 |
| Sup. A, 1952 (Good) | 1200 |
| Cub, mo., 1950 (Excellent) | 1500 |
| Cub, cult., nar, 1948 (Good) | 1050 |
| Cub, cult., plt., 1948 (Good) | 1050 |

**KUBOTA TRACTORS**

| | |
|---|---|
| B6000E, mo., (Excellent) | 1700 |
| L210, mo., (Excellent) | 1950 |

**OLIVER TRACTOR**

| | |
|---|---|
| 1855 diesel, 1973 (Good) | 3500 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1155 diesel, cab, duals, 1978 (Fair) | 5400 |
| 1155 diesel, 1974 (Fair) | 4300 |
| 265 diesel, 1975 (Good) | 5600 |
| 265 diesel, 1975 (Good) | 5500 |
| 180 diesel, ldr., 1967 (Good) | 3550 |
| 175 diesel, 1972 (Excellent) | 4000 |
| 175 diesel, 1967 (Good) | 3400* |
| 165 diesel, 1972 (Excellent) | 3700* |
| 165 diesel, 1972 (Good) | 3500 |
| 165 diesel, 1968 (Good) | 3400 |
| 165 diesel, 1968 (Good) | 3300 |
| 165 diesel, 1968 (Fair) | 2450 |
| 165 diesel, 1968 (Good) | 3200* |
| 165 diesel, 1966 (Rough) | 2100* |
| 150 diesel, 1965 (Good) | 3100* |
| 150 diesel, 1965 (Good) | 3100 |
| 2135 diesel, 1967 (Rough) | 1600 |
| 135 diesel, 1974 (Fair) | 2575 |
| 135 diesel, 1973 (Rough) | 2100 |
| 135, 1970 (Excellent) | 3800 |
| 135 diesel, 1967 (Good) | 2750* |
| 135 diesel, sprayer, 1967 (Good) | 2700* |
| 135 diesel, 1967 (Fair) | 2400 |
| 135, 1966 (Rough) | 1600* |
| 135 diesel, 1966 (Good) | 2850 |
| 35 diesel, 1963 (Excellent) | 2600 |
| 35 diesel, 1963 (Rough) | 1250* |
| T020, 1951 (Good) | 1225 |
| T020, 1950 (Fair) | 775 |
| T020, 1950 (Good) | 850 |
| T020, 1950 (Rough) | 650 |

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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## ouse computer systems page 10

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# Implement & Tractor

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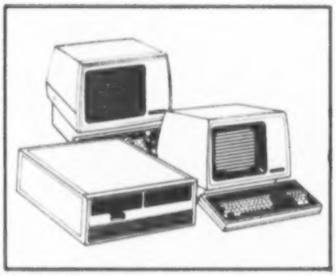

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TO FIT
TRY ME

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**8: A Bank Is a Bank...Or Is It?** Three dealers find that working with two different banks pays off, especially when it means a better credit deal for customers.

**10: In-House Computers for Dealers.** The start of a 3-part series covering electronic management tools for dealerships. This month, an outline of the hardware and software of 20 different systems.

**14: Will Farm Plan Change the Way Most Dealers Operate?** If anything will get dealers out of the amateur banking business, it may be Farm Plan.

**16: NFPEDA Convention.** The national dealers association launches its first Expo and Marketing Show, and endorses a worldwide ag-industry trade event.

**22: New at the Royal.** A look at some of the most interesting items from this year's Royal Agricultural Society show in Britain.

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**On the cover...**I&T kicks off a series on in-house computer systems.

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**DEPARTMENTS**

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# I&T Update

## July Retail Sales: Why So Different?

Unit sales of two-wheel-drive tractors presented a contrasting good-news/bad-news picture, according to the July flash report from the Farm & Industrial Equipment Institute. The smallest (under 40 hp) and the biggest (140 hp and over) showed much of the strength they had in June, but the 40-99 and 100-139 brackets fared worse than they did in 1982.

Other products in the flash report were also down compared with last July.

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | July | | | January-July | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| **Farm Wheel Tractors:** | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 3,889 | 3,264 | + 19.1 | 30,431 | 27,886 | + 9.1 |
| 40-100 hp | 3,195 | 3,641 | (12.2) | 23,820 | 25,308 | ( 5.9) |
| 100-140 hp | 1,041 | 1,665 | (37.5) | 9,090 | 12,078 | (24.7) |
| Over 140 hp | 1,033 | 899 | + 14.9 | 7,124 | 6,502 | + 9.6 |
| **Total 2-wheel drive** | **9,158** | **9,469** | **( 3.3)** | **70,465** | **71,774** | **( 1.8)** |
| 4-wheel drive | | | | | | |
| Under 200 hp | 116 | 146 | (20.5) | 1,080 | 1,979 | (45.4) |
| Over 200 hp | 251 | 279 | (10.0) | 1,532 | 2,195 | (30.2) |
| **Total 4-wheel drive** | **367** | **425** | **(13.6)** | **2,612** | **4,174** | **(37.4)** |
| **Total All Tractors** | **9,525** | **9,894** | **( 3.7)** | **73,077** | **75,948** | **( 3.8)** |
| S-P Combines | 1,008 | 1,432 | (29.6) | 5,578 | 6,080 | ( 8.3) |
| Balers (200-lb. bales) | 2,267 | 2,402 | ( 5.6) | 6,786 | 6,183 | + 9.8 |
| Forage Harvesters (Shear-bar type) | 578 | 613 | ( 5.7) | 2,001 | 2,250 | (11.1) |
| Mower-Conditioners | 2,937 | 2,955 | ( 0.6) | 10,965 | 10,067 | + 8.9 |

## Kubota Tells Some of Its U.S. Marketing Plans

Kubota Tractor Corp. intends to introduce an 88 pto horsepower tractor to the U.S. market in 1984. And the Compton, Calif., company intends to add to its present 1,000 U.S. dealers, according to William Templeton, vice-president, at a recent press conference in Kansas City, Mo.

"About 25 per cent of our dealers, and some of our biggest, are independents, *i.e.*, we are their main tractor line. We expect to develop more independents with a broader product range."

Kubota now claims to be fourth in U.S. tractor unit retail sales (behind Deere, Ford and IH) and fourth in the world (behind Massey-Ferguson, Ford and Deere). In the 1983 fiscal year (ended April 15), Kubota's farm equipment business (including engines, industrial units and other farm equipment in addition to tractors) produced sales of $930 million, a 7.4 per cent increase over 1982.

## More Shows on Global Circuit

Agricultural shows, or trade fairs with agricultural emphasis, are set for several locations in the Near East, Middle East and Far East through the next 11 months:

- Oct. 2-7, 1983: Agrogulf '83, Abu Dhabi, U.A.E. (U.S. contact – MABCO, 617/536-3442).
- Oct. 3-6, 1983: Agritech '83, Tel Aviv, Israel (U.S. contact – Israel Trade Office, 212/560-0600).
- Mar. 10-24, 1984: Cairo International Fair, Cairo, Egypt (U.S. contact – R. D. Robinson, U.S. Commerce Dept. 202/377-4015).
- May 8-25, 1984: Algiers International Fair, Algiers, Algeria (U.S. contact – Walter Fausel, U.S. Commerce Dept. 202/377-4065).
- Aug. 3-6, 1984: AGASIA '84, Kuala Lumpur, Malaysia (U.S. contact – Clapp & Poliak International, 301/657-3090).

In addition, the Commerce Dept. is conducting a farm and irrigation equipment trade mission to Algeria, Morocco and Tunisia Oct. 29-Nov. 14 (U.S. contact – Mary Wiening, project manager, U.S. Commerce Dept., 202/377-4708) and a catalog show of farm equipment Nov. 7-22 at two locations in New Zealand and three in Australia (U.S. contact – Louis Quay, U.S. Commerce Dept., 202/377-3973). Harold Halter, executive vice-president of the Farm Equipment Manufacturers Assn., will be the catalog show's representative.

## Briefly....

**Ed H. Elstun**, president of **Snowco**, Omaha, Neb., has purchased the company from Beatrice Foods Co. He joined the firm 30 years ago and has been president for seven years. Snowco, a Beatrice division since 1970, makes grain augers, grain cleaners, bale conveyors and trailers.

**National** service managers have an average mean salary of $40,142, according to a survey of the **National Assn. of Service Managers.** It's an 8.3 per cent increase from 1982. Service managers for merchandising firms with sales over $50 million averaged $51,188, with the top 10 per cent of this group making $157,928 or more. The bottom 10 per cent of those in manufacturing firms with annual sales under $10 million made $20,599 or less.

**J I Case Co.** and the **United Auto Workers** have signed a labor pact that will pass savings from wage and benefit restraints directly to Case customers in the form of rebates. Buyers will get back $3,000 on selected ag and construction models in September and October. The ag units are 90 series two- and four-wheel-drive models over 100 hp.

**Robotics in agriculture** will be the focus of a conference Oct. 2-4 at Tampa, Fla., sponsored by the U. of Florida, Gainesville, and the American Society of Agricultural Engineers. Topics will include the use of three-dimensional vision systems, computer control of grain combines, robotic sheep shearing, orange picking and tractor control. Contact: Conference director, 904/392-5930.

**Vicon, B.V.**, Nieuw Vennep, Holland, has acquired from **International Harvester**, for about $350,000, the patents and production rights to a rectangular baler. The baler will be made at Nieuw Vennep and supplied to Vicon dealers worldwide and IH dealers outside the Western Hemisphere.

I&T
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## YODER & FREY, INC.
## Archbold, Ohio
## July 12, 1983

### FERGUSON & MASSEY-FERGUSON TRACTORS

| | |
|---|---|
| 202, ldr., (Rough) | 2500 |
| 35 diesel, 1959 (Rough) | 1250 |
| 50 ldr., 1960 (Rough) | 2350 |
| 65 diesel, 1962 (Fair) | 2000 |
| 65, 1959 (Rough) | 1550 |
| 175, 1969 (Rough) | 3800 |
| 235 diesel, 1978 (Good) | 4300* |
| 265, 1979 (Fair) | 6800 |
| 1080, 1969 (Fair) | 3925 |
| 1085, | 5575 |
| 1100 diesel, 1967 (Rough) | 3475 |
| 1130 diesel, | 3575 |

### FORD TRACTORS

| | |
|---|---|
| 9N, 1939 (Fair) | 700* |
| 9N, 1939 (Fair) | 925* |
| 4000, ldr., 1963 (Fair) | 3300* |
| 5000 diesel, 1971 (Rough) | 2200* |
| Jub. 1953 (Fair) | 1775 |
| 6600 diesel, (New) | 8800* |
| 4500 backhoe, ldr., 1971 | 5300 |

### ALLIS-CHALMERS TRACTORS

| | |
|---|---|
| C, 1946 (Rough) | 275* |
| WD, 1950 (Fair) | 475* |
| WD, 1950 (Fair) | 590 |
| D-14, 1963 (Fair) | 875 |
| D-14, 1964 (Fair) | 1450* |
| D-15, (Good) | 2500* |
| D-15, 1966 (Good) | 2600 |
| D-17, 1967 (Fair) | 3000 |
| D-17, 1964 (Fair) | 1650 |
| 7000, 1975 (Fair) | 8300* |
| 7060 diesel, 1974 (Good) | 8800* |

### MINNEAPOLIS-MOLINE TRACTORS

| | |
|---|---|
| M-602, 1963 (Fair) | 2200 |
| M-670, 1966 (Rough) | 1600* |
| M-670, 1967 (Fair) | 2400* |
| G-705 diesel, 1967 (Rough) | 1600* |
| G-707 diesel, (Rough) | 1900* |
| G-900 diesel, 1966 (Fair) | 2600 |
| UB, 1950 (Fair) | 850* |

### INTERNATIONAL HARVESTER TRACTORS

| | |
|---|---|
| A, 1945 (Fair) | 750* |
| Cub, 1963 (Rough) | 1150* |
| H, 1946 (Rough) | 750 |
| H, 1950 (Fair) | 530 |
| H, 1946 (Fair) | 500 |
| Sup. H, 1952 (Good) | 1000 |
| M, 1941 (Rough) | 400* |
| M, 1952 (Rough) | 775* |
| M, | 410 |
| Sup. MTA, 1952 (Rough) | 600* |
| Sup. C, 1951 (Rough) | 620 |
| Sup. C, 1951 (Fair) | 1000 |
| C, 1947 (Rough) | 690 |
| B. 1945 (Fair) | 520 |
| 84 Hydro, 1980 (Good) | 8000 |
| 300, 1956 (Rough) | 700* |
| 300, 1957 (Fair) | 900 |
| 560, 1960 (Fair) | 1825* |
| 560 diesel, 1960 (Fair) | 2000 |
| 656 diesel, 1968 (Fair) | 3050 |
| 656 ldr., 1967 (Good) | 4200* |
| 806 diesel, 1965 (Rough) | 2975* |
| 826 diesel, 1970 (Rough) | 5600* |
| 1066 diesel, 1976 (Fair) | 6400 |
| 1066 diesel, 1975 (Fair) | 5250* |
| 1066, 1975 (Good) | 7600 |
| 1256 diesel, 1968 (Fair) | 5700* |
| 4166, 1973 (Fair) | 9000* |

### WHITE TRACTORS

| | |
|---|---|
| 2-150, 1978 (Good) | 9900* |
| 1870 diesel, (Fair) | 3900 |

### CASE TRACTORS

| | |
|---|---|
| 580, backhoe, ldr., | 8450 |
| 600 diesel, 1956 (Fair) | 900* |
| 930 diesel, | 3200 |
| 930, 1961 (Fair) | 1600 |
| 1030 diesel, | 3950 |
| 1070 diesel, | 6200 |
| 1070, 1970 (Fair) | 5700 |
| 1070, 1972 (Fair) | 7200* |
| 1370, 1972 (Fair) | 9200 |
| 2470, 1972 (Fair) | 6500* |

### JOHN DEERE TRACTORS

| | |
|---|---|
| A, | 320 |
| H, | 310 |
| 60, 1956 (Rough) | 560 |
| 70, 1955 (Rough) | 610 |
| 70, 1954 (Fair) | 750* |
| 440 backhoe, ldr., | 3950 |
| 430, 1958 (Fair) | 2000* |
| 620 diesel, 1957 (Fair) | 1950 |
| 720, 1957 (Rough) | 1200* |
| 730 diesel, 1958 (Fair) | 2650* |
| 1010, 1962 (Rough) | 1300* |
| 2010, 1961 (Fair) | 2600* |
| 2010, ldr., 1963 (Rough) | 2900* |
| 3020 diesel, 1968 (Rough) | 4000* |
| 4010 diesel, 1963 (Fair) | 3800* |
| 4020 diesel, 1966 (Fair) | 4750* |
| 4020 diesel, 1966 (Fair) | 6450 |
| 4020 diesel, 1967 (Fair) | 4500* |
| 4020 diesel, 1966 (Fair) | 5500 |
| 4020, 1964 (Rough) | 5300 |
| 4020, 1966 (Fair) | 4200* |
| 4020, 1965 (Fair) | 3725 |
| 4030 diesel, 1977 (Fair) | 7400* |
| 4230, 1976 (Fair) | 8200 |
| 4440 diesel, 1979 (Fair) | 13,200* |
| 4520, | 7200 |
| 4620 diesel, 1972 (Fair) | 7400* |
| 4630, 1976 (Fair) | 8800* |
| 8630, 1977 (Fair) | 19,500* |

### OLIVER TRACTORS

| | |
|---|---|
| 55 diesel, | 800* |
| 77, | 240 |
| 950, (Rough) | 1100* |
| 1650, ldr., | 5000 |
| 1750 diesel, 1965 (Fair) | 3050 |
| 1800 diesel, 1961 (Fair) | 1700* |
| 1855 diesel, 1972 (Good) | 3700* |
| 2255, 1973 (Good) | 8750* |
| Sup. 77 diesel, 1951 (Rough) | 450 |

### MASSEY-HARRIS TRACTORS

| | |
|---|---|
| 44G, 1947 (Fair) | 470 |
| 444, 1955 (Fair) | 550* |

## COMBINE AUCTION PRICES

### OLIVER COMBINES

| | |
|---|---|
| 25 | 850 |
| 525 | 625* |
| 525 | 2000 |
| 535 | 1600 |
| 535 | 1600* |
| 535 | 1400* |
| 535 | 1750* |
| 545 | 2700 |
| 7300 | 5400 |
| 7300 | 6500 |
| 7300 | 7500 |
| 7600 | 5500 |
| 7600 | 5800* |
| 7600 | 7650 |
| 7600 | 4000* |
| 7800 | 6150 |

### ALLIS-CHALMERS COMBINES

| | |
|---|---|
| A-II | 1700 |
| A-II | 1500 |
| E | 1200 |
| E | 700* |
| E | 1650 |
| E | 1100* |
| E | 1350 |
| E | 3000* |
| E | 1100 |
| E-III | 3300* |
| E-III | 4000* |
| E-III | 4000* |
| F | 9500 |
| F | 10,150 |
| K | 6900 |
| K | 4500* |
| K.K | 6300 |
| L w/2 hds | 6500 |
| G | 4250 |
| G | 3350 |
| G | 5300 |
| C-II | 1500 |
| F2 | 9700 |
| F2 | 13,500 |
| K2 | 10,250* |

### MINNEAPOLIC-MOLINE COMBINE

| | |
|---|---|
| W4 UNI | 675 |

### JOHN DEERE COMBINES

| | |
|---|---|
| 40 | 650* |
| 40 | 600 |
| 45 | 900* |
| 45 | 1000 |
| 45 | 400* |
| 45 | 625* |
| 45 | 1100* |
| 45 | 1250* |
| 45 | 2400 |
| 45 | 700 |
| 55 | 550 |
| 55 | 2300 |
| 55 | 1300* |
| 55 | 2000* |
| 65 | 1400* |
| 95 | 3000* |
| 105 | 3600* |
| 105 | 3000 |
| 3300 | 5450 |
| 3300 | 6700 |
| 4400 | 8000* |
| 4400 | 5300 |

(More...)

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# Auctions
*(continued)*

| | |
|---|---|
| 4400 | 7000* |
| 4400 | 4900* |
| 4400 | 14,800 |
| 6600 G | 7250* |
| 6600 diesel, | 11,250 |
| 6600 G | 5700* |
| 6600 diesel, | 5540 |
| 6600 G | 7200* |
| 7700 | 6750 |
| 7700 | 7250* |
| 7700 | 5500* |

**CASE COMBINES**

| | |
|---|---|
| 960 | 1700* |
| 660 | 750 |
| 660 | 3250 |
| 660 | 1300* |
| 660 | 1800* |
| 960 | 1600* |
| 1160 | 1800* |
| 1660 | 1400* |

**MASSEY-FERGUSON COMBINES**

| | |
|---|---|
| 300 | 1000* |
| 300 | 2900* |
| 300 | 1250 |
| 300 | 3200* |
| 300 | 3500* |
| 300 | 975 |
| 300 | 3350 |
| 35 | 1400* |
| 35 | 1025 |
| 303 | 2200* |
| 410 D | 4050 |
| 410 | 5000* |
| 410 | 1600* |
| 510 | 2900* |
| 510 D | 7350 |
| 510 | 3600* |
| 510 D | 3650 |
| 510 G | 2650 |
| 510 | 4750 |
| 510 D | 5200* |
| 510 | 2700* |
| 510 D | 6200* |

**INTERNATIONAL HARVESTER COMBINES**

| | |
|---|---|
| 203 | 1000* |
| 303 | 2300* |
| 403 | 1500* |
| 315 | 2925 |
| 315 | 1900* |
| 615 | 4500* |
| 715 | 5500 |
| 715 | 3750* |
| 715 | 5000* |
| 715 | 5500* |
| 815 | 3200* |
| 815 | 3400* |
| 915 | 11,500* |
| 915 | 3150* |
| 915 | 5250* |
| 915 | 7100* |
| 127 | 400 |
| 93 | 1100 |
| 1440 | 23,500* |

**NEW HOLLAND COMBINE**

| | |
|---|---|
| TR-70 | 12,400 |

## JONES FARM EQUIPMENT CO.
## Dothan, Alabama
## July 12, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| W.D. 1952 (Good) | 500 |
| B, 1953 (Good) | 700 |

**DAVID BROWN TRACTOR**

| | |
|---|---|
| 990 diesel, ldr., 1966 (Fair) | 1475 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1155 diesel, 1974 (Good) | 5500 |
| 1150 diesel, 1973 (Rough) | 2850* |
| 275 diesel, 1977 (Excellent) | 7300* |
| 245 diesel, 1979 (Excellent) | 8000 |
| 180 diesel, 1966 (Good) | 2725 |
| 180 diesel, 1966 (Good) | 3200 |
| 175 diesel, 1973 (Excellent) | 4200 |
| 175 diesel, 1969 (Good) | 3600 |
| 175 diesel, 1967 (Good) | 3700* |
| 165 diesel, 1974 (Good) | 3150 |
| 165 diesel, 1971 (Good) | 3300 |
| 165 diesel, 1967 (Good) | 3100* |
| 165 diesel, 1966 (Good) | 3000 |
| 165 diesel, 1966 (Good) | 3400 |
| 150 diesel, 1967 (Good) | 3250* |
| 135 diesel, 1973 (Excellent) | 3500* |
| 135 diesel, 1969 (Good) | 3350 |
| 135 diesel, 1967 (Excellent) | 3500* |
| 135 diesel, 1967 (Good) | 3250 |
| 135 diesel, 1967 (Good) | 3000* |
| 135, 1966 (Good) | 3150 |
| 65 diesel, 1962 (Fair) | 1600 |
| 65 diesel, 1958 (Excellent) | 2250 |
| 35, 1962 (Good) | 1750 |
| 35 diesel, 1960 (Excellent) | 2450 |
| 35, 1956 (Excellent) | 2000 |
| TO20, 1950 (Excellent) | 1500 |

**FORD-FERGUSON TRACTOR**

| | |
|---|---|
| 9N, 1940 (Fair) | 525 |

**FORD TRACTORS**

| | |
|---|---|
| 9700 diesel, 1978 (Good) | 7900 |
| 9700 diesel, 1978 (Excellent) | 9500 |
| 8000 diesel, 1970 (Rough) | 2400 |
| 7600 diesel, 1976 (Good) | 5200* |
| 7600 diesel, 1972 (Excellent) | 8000 |
| 4000 diesel, 1972 (Excellent) | 4800 |
| 4000 diesel, 1969 (Good) | 3250 |
| 4000 diesel, 1967 (Fair) | 2550 |
| 4000 diesel, 1967 (Good) | 3000 |
| 4000 diesel, 1964 (Good) | 1950* |
| 4000 diesel, Select-O-Speed 1963 (Fair) | 1000 |
| 3000 diesel, 1977 (Fair) | 3200* |
| 3000 diesel, 1969 (Good) | 3350 |
| 3000 diesel, 1969 (Good) | 3350 |
| 3000 diesel, 1966 (Good) | 2800 |
| 3000 diesel, 1966 (Rough) | 1150 |
| 3000 diesel, 1968 (Good) | 3550 |
| 2000, 1967 (Fair) | 1950 |
| 2000 diesel, 1962 (Rough) | 825 |
| 650, 1956 (Good) | 1925 |
| 641 diesel, 1958 (Fair) | 1300 |
| 641, 1961 (Good) | 2150 |
| 641, 1960 (Good) | 2200 |
| 641, 1958 (Good) | 1800 |
| Sup. Dexta 1962 (Good) | 1750 |
| Dexta, 1959 (Good) | 1600 |
| Jub., 1953 (Excellent) | 2500* |
| 8N, 1951 (Excellent) | 1800 |
| 8N, 1951 (Excellent) | 1850 |
| 8N, 1951 (Good) | 1475 |
| 8N, 1948 (Rough) | 700 |
| 8N, 1948 (Rough) | 750 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| 1086 diesel, cab, duals, 1977 (Good) | 8400* |
| 966 diesel, 1972 (Fair) | 5400 |
| 656 diesel, 1965 (Good) | 3750* |
| 574 diesel, 1972 (Fair) | 3150 |
| 574 diesel, 1972 (Excellent) | 5400 |
| 504 diesel, 1962 (Fair) | 900* |
| 454 diesel, 1971 (Good) | 2750 |
| 434 diesel, (Good) | 3450 |
| B414 diesel, 1963 (Fair) | 850 |
| 364 diesel, ldr., 1977 (Good) | 2700* |
| 354 diesel, 1973 (Fair) | 2100* |
| 354 diesel, 1973 (Good) | 2850* |
| 340, 1962 (Good) | 1225* |
| M, 1946 (Fair) | 300 |
| Sup. C, 1953 (Rough) | 320 |
| C, 1948 (Good) | 625 |
| C, 1948 (Rough) | 170* |
| Sup. A, 1949 (Good) | 1250 |
| Cub, 1949 (Good) | 900 |
| Cub, 1948 (Rough) | 400 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 5020 duals, 1969 (Fair) | 4600* |
| 4630 diesel, cab, 1975 (Excellent) | 10,250 |
| 3010 diesel, 1961 (Fair) | 3000 |
| 2840 diesel, 1979 (Excellent) | 11,000 |
| 2840 diesel, bld., 1977 (Good) | 8425 |
| 2640 diesel, 1978 (Good) | 6700 |
| 2640 diesel, 1977 (Good) | 6650 |
| 2630 diesel, 1975 (Good) | 5400 |
| 2630 diesel, 1974 (Good) | 5700 |
| 2030 diesel, 1974 (Good) | 4500* |
| 1020 diesel, 1966 (Fair) | 2175 |
| 1010, ldr., 1962 (Fair) | 950 |
| 820 diesel, 1970 (Good) | 2950 |
| 830 diesel, (Excellent) | 4225 |
| R, 1950 (Rough) | 325 |
| 430, 1959 (Good) | 1450* |
| 420, 1956 (Fair) | 750 |

**OLIVER TRACTORS**

| | |
|---|---|
| 1355 diesel, 1970 (Good) | 2900* |
| 77 diesel, 1950 (Rough) | 275 |

## ENLOW AUCTION CO.
## Tulsa, Okla.
## July 9, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| B, 1940 (Good) | 450* |
| WD, 1950 (Fair) | 225 |
| D15, 1962 (Fair) | 1500 |
| 180 diesel, 1969 (Good) | 2900 |
| 190XT diesel, 1965 (Good) | 3300 |
| 190XT diesel, 1968 (Good) | 3500 |
| 5040 diesel, 1976 (Fair) | 2550 |

**CASE TRACTORS**

| | |
|---|---|
| 400 diesel, 1955 (Fair) | 650 |
| 1070 diesel, 1971 (Good) | 4800* |
| 1190 diesel, 1981 (Excellent) | 7800* |
| 1190 diesel, 1982 (Excellent) | 8250 |

**FERGUSON TRACTORS**

| | |
|---|---|
| 20, 1950 (Good) | 1200* |
| 20, 1951 (Fair) | 875* |
| 30, 1954 (Good) | 1875 |
| 35, 1955 (Good) | 2000 |
| 35, 1956 (Good) | 2100* |

**FORD TRACTORS**

| | |
|---|---|
| 9N, 1941 (Fair) | 875 |
| 9N, 1942 (Good) | 1050* |
| 9N, 1942 (Good) | 1500 |
| 9N, 1943 (Good) | 1100 |
| 9N, 1945 (Good) | 1200* |
| 9N, 1945 (Fair) | 800* |
| 9N, 1945 (Good) | 1350* |
| 8N, 1947 (Fair) | 1100 |
| 8N, 1947 (Fair) | 1000* |
| 8N, 1948 (Good) | 1450 |
| 8N, 1948 (Fair) | 1000 |
| 8N, 1948 (Good) | 1250* |
| 8N, 1948 (Good) | 1300* |
| 8N, 1949 (Good) | 1500 |
| 8N, 1949 (Good) | 1800 |
| 8N, 1949 (Good) | 1450* |
| 8N, 1950 (Good) | 1300 |
| 8N, 1950 (Good) | 1200 |
| 8N, 1950 (Good) | 1850 |
| 8N, 1951 (Fair) | 1400* |
| 8N, 1951 (Good) | 1725 |
| 8N, 1952 (Good) | 2025 |

*(More...)*

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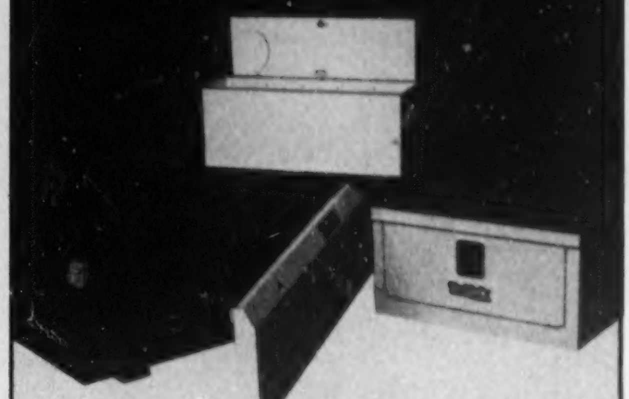

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*(continued)*

| | |
|---|---|
| 8N, 1952 (Good) | 1300 |
| 8N, 1952 (Good) | 1500* |
| 8N, 1952 (Good) | 1600 |
| 8N, 1952 (Good) | 1700* |
| 8N, 1952 (Good) | 1625* |
| NAA, 1953 (Fair) | 1550* |
| NAA, 1953 (Good) | 2100* |
| NAA, 1953 (Good) | 1900 |
| 600, 1954 (Good) | 2125* |
| 600, 1954 (Good) | 1860 |
| 860, 1954 (Good) | 2100 |
| 860, 1956 (Good) | 2650 |
| 860, 1956 (Good) | 2000* |
| 861, 1957 (Good) | 2550 |
| 801, 1957 (Good) | 2550 |
| 801, 1958 (Good) | 2000* |
| 2000, 1963 (Good) | 2800 |
| 3000, 1965 (Fair) | 2700* |
| 3000, 1967 (Good) | 3400 |
| 3000, 1968 (Good) | 2900 |
| 3000, 1968 (Good) | 3000 |
| 3000, 1969 (Good) | 3250 |
| 3000 diesel, ldr., 1973 (Good) | 5000 |
| 4000, ldr., 1963 (Good) | 3500 |
| 4000, 1966 (Good) | 3500 |
| 4000 diesel, 1967 (Good) | 3350 |
| 4000 diesel, 1967 (Fair) | 3000* |
| 4000 diesel, Select-O-Speed, 1969 (Good) | 2500* |
| 5000 diesel, 1966 (Fair) | 3100* |
| 5000 diesel, 1968 (Good) | 3950* |
| 5000 diesel, 1968 (Fair) | 3000 |
| 5000 diesel, 1970 (Good) | 4200 |
| 3400, 1967 (Good) | 3250* |
| 3500, ldr., 1969 (Good) | 4350* |
| 6000 diesel, 1968 (Good) | 1600 |
| 5600 diesel, ldr., 1980 (Excellent) | 8750* |

### INTERNATIONAL HARVESTER TRACTORS

| | |
|---|---|
| Cub, equip., 1960 (Good) | 1525 |
| Cub, equip., 1961 (Good) | 1600 |
| Cub, mo., 1961 (Good) | 1600 |
| Cub Loboy, mo., 1962 (Good) | 1750 |
| 185 Cub, mo., 1968 (Good) | 2500* |
| A, 1944 (Good) | 550* |
| B, 1942 (Good) | 400 |
| B, mo., 1945 (Good) | 850 |
| WD-9, 1953 (Good) | 400* |
| 504, 1965 (Fair) | 850* |

### JOHN DEERE TRACTORS

| | |
|---|---|
| 70, 1954 (Good) | 900 |
| 3010 LP, 1962 (Good) | 2500* |
| 4010 diesel, 1962 (Good) | 4250 |
| 4010 diesel, 1964 (Good) | 5200 |
| 4020 diesel, 1966 (Good) | 4500 |
| 1120 diesel, 1970 (Good) | 3000 |
| 830, 1974 (Good) | 3800* |
| 650, 1975 (Good) | 3800* |
| 850, ldr., 1976 (Good) | 4700 |

### MASSEY-FERGUSON TRACTORS

| | |
|---|---|
| 25 diesel, 1960 (Good) | 1875 |
| 35 diesel, 1961 (Good) | 2250* |
| 35, 1962 (Good) | 1875 |
| 65, 1960 (Good) | 1950 |
| 65, 1961 (Fair) | 1550* |
| 65 diesel, 1961 (Good) | 2550 |
| 65, 1962 (Good) | 2150* |
| 65 diesel, 1962 (Good) | 3350 |
| 65, 1962 (Fair) | 1850* |
| 65 diesel, 1963 (Good) | 2600 |
| 65, 1963 (Good) | 2150* |
| 65 diesel, 1963 (Good) | 2750* |
| Super 90, 1961 (Good) | 1950* |
| 130 diesel, 1966 (Fair) | 2000 |
| 135, 1968 (Good) | 3300* |
| 165 diesel, ldr., 1967 (Good) | 3450* |
| 165 diesel, 1969 (Good) | 3800 |
| 165 diesel, 1971 (Good) | 3950 |
| 175 diesel, 1972 (Good) | 4250 |
| 175 diesel, 1973 (Good) | 4300* |
| 180 diesel, 1966 (Good) | 3100 |
| 230 diesel, 1982 (New) | 8100 |
| 245 diesel, ldr., 1980 (Excellent) | 8250 |
| 203, 1961 (Fair) | 2350 |
| 1085 diesel, 1975 (Good) | 6500 |
| 1085 diesel, 1977 (Good) | 6850 |
| 50 diesel, backhoe, 1976 (Good) | 6500 |

### MINNEAPOLIS-MOLINE TRACTORS

| | |
|---|---|
| 670, 1966 (Good) | 1850* |
| G-1000, 1968 (Good) | 3500* |

### OLIVER TRACTOR

| | |
|---|---|
| 550, ldr., 1959 (Fair) | 1050* |

---

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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The business magazine of the farm & industrial equipment industry

October 1983

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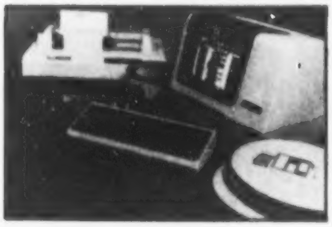
*The business magazine of the farm & industrial equipment industry*

October 1983 • Vol. 98 • No. 12



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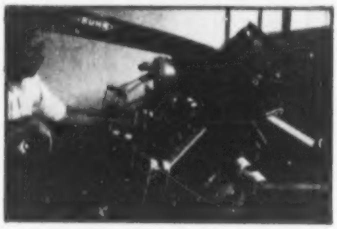

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**8:** **Bytes and Pieces.** Computers are a natural for controlling parts inventory, but finding a system that satisfies the dealer and his suppliers poses some knotty problems.

**12:** **Comparing Your Shop's Performance.** The facts you need to analyze the profitability trend of your service department.

**18:** **Survey of Shortline Manufacturers:** Their distribution, the trends they see, and how their views compare with the views of dealers.

**20:** **Taking Pulses in Motown.** A preview of three conventions set for October and November by FEMA, FEWA and AIMRA.

**22:** **Goin' to the Country.** The almost-lost art of on-farm demonstrating is making a comeback as tough times rekindle interest in putting different ideas across.

**29:** **Versatile Upgrades Mid-Sized Entry.** The Canadian four-wheelers aim at a bigger market share with a new tractor.

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**On the cover...**Off to Detroit for three big conventions.

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# I&T Update

## August Retail Sales: Another Skid

After considerable optimism in the spring that retail sales of farm equipment were definitely in comeback status, a slowed-up July and now an even slower August have blown such hopes away for a while. Sales of all tractor horsepower groups were off. Only hay balers (bales under 200 lbs.) and mower-conditioners were showing gains. Here is the monthly flash report of the Farm & Industrial Equipment Institute:

| | Unit Retail Sales | | | | | |
|---|---|---|---|---|---|---|
| | August | | | January-August | | |
| | 1983 | 1982 | Pct. Change | 1983 | 1982 | Pct. Change |
| **Farm Wheel Tractors:** | | | | | | |
| 2-wheel drive | | | | | | |
| Under 40 hp | 3,256 | 3,892 | (16.3) | 33,674 | 31,778 | +6.0 |
| 40-100 hp | 2,544 | 2,926 | (13.1) | 26,347 | 28,234 | ( 6.7) |
| 100-140 hp | 718 | 1,079 | (33.5) | 9,802 | 13,157 | (25.5) |
| Over 140 hp | 537 | 572 | ( 6.1) | 7,658 | 7,074 | +8.3 |
| **Total 2-wheel drive** | **7,055** | **8,469** | **(16.7)** | **77,481** | **80,243** | **( 3.4)** |
| 4-wheel drive | | | | | | |
| Under 200 hp | 119 | 146 | (18.5) | 1,193 | 2,125 | (43.9) |
| Over 200 hp | 163 | 236 | (30.9) | 1,685 | 2,431 | (30.7) |
| **Total 4-wheel drive** | **282** | **382** | **(26.2)** | **2,878** | **4,556** | **(36.8)** |
| **Total All Tractors** | **7,337** | **8,851** | **(17.1)** | **80,359** | **84,799** | **( 5.2)** |
| S-P Combines | 1,106 | 1,309 | (15.5) | 6,685 | 7,389 | ( 9.5) |
| Balers (200-lb. bales) | 981 | 980 | +0.1 | 7,773 | 7,163 | +8.5 |
| Forage Harvesters (Shear-bar type) | 394 | 582 | (32.3) | 2,394 | 2,832 | (15.5) |
| Mower-Conditioners | 1,266 | 1,210 | +4.6 | 12,234 | 11,277 | +8.5 |

## Deere 9 Months: Sales Off 17% To $2.87 Billion

Deere & Co. had sales in the first nine months of fiscal 1983 (ended July 31) of $2.866 billion, off 17 per cent from 1982's $3.461 billion. Third period sales were $995 million, 13 per cent off the $1.147 billion a year ago.

Deere had a net loss for the nine months of $34.7 million; last year, net earnings were $40.8 million. The third period produced a profit of $5.1 million ($4.2 million in 1982).

Deere lowered trade receivables in the period by $157 million to $2.79 billion. A year earlier, they were $2.78 billion.

"Production for the full fiscal year will be approximately 23 per cent lower than a year ago," said Robert A. Hanson, chairman.

Farm equipment sales for both the third period and the nine months were 20 per cent lower than a year ago. Industrial equipment sales for the nine months were up 1 per cent and for the quarter were 36 per cent higher. Overseas sales were off by 21 per cent in the third quarter and by 24 per cent for the year.

## MF 2nd Period Sales Down, But Losses Reduced

Massey-Ferguson Ltd. had a net loss of $11.3 million in the second quarter, ended July 31, compared with a net loss of $87 million in the same three months of 1982. Sales for the quarter were $401 million, down 23 per cent from $518 million a year earlier.

For the six months, there was a net loss of $29.2 million; a year earlier, the loss was $112.7 million. Net sales declined from $1.076 billion to $804.4 million.

North American sales in the first half were down only 1.6 per cent to $257 million, but Latin American volume fell sharply—from $169 million in 1982 to $21 million. In the second quarter, North American sales were ahead of a year earlier—from $114 million to $140 million. The increase was attributed to special marketing programs.

Victor Rice, MF chairman and chief executive officer: "We still cannot predict with confidence when recovery will begin."

## Canadian Retail Sales Show Mixed Trends

Canadian retail sales through August showed declines in some product categories, strength in others.

Tractor sales (over 40 hp) were off 20 per cent in August, off 13 per cent for the first eight months to 9,180 units. Worst hit this year: four-wheelers, off 34 per cent at 1,284. Least hit: over-100-hp two-wheelers, off 6 per cent at 3,284.

Conversely, self-propelled combine sales show strength. August's unit volume, 547, was up 46 per cent; for the year, sales of 1,301 were up 13 per cent. Pull-type combine sales were about even with 1982—691 vs. 705. Large balers: up 8 per cent at 1,719. Small balers: off 1 per cent at 1,595.

## Briefly...

**Britain's** farm tractor registrations are up through the first five months of 1983—from 11,767 units to 13,016, according to BAGMA, Britain's dealer organization.

**French** farm equipment manufacturers (SYGMA) report tractor sales in the first half of 1983 are down 7 per cent at 19,435 units. Domestic sales were off 8 per cent at 10,088 units; exports fell 6 per cent to 9,347. Combine sales were up 7 per cent at 1,124.

**The Farm** & Industrial Equipment Institute confesses that it struck out in its attempts to book three socko attractions for its Oct. 22-25 convention—astronaut Sally Ride, Secretary of State George Shultz and noted auto salesman Lee Iacocca. Instead, FIEI will bring to Lake Buena Vista, Fla., ABC-TV's Ted Koppel, CBS-TV's Andy Rooney and Wall Street's Gary Shilling.

**New location** for the Farm Equipment Mfrs. Assn. is 243 N. Lindbergh Blvd., St. Louis, Mo. 63141, telephone 314/991-0702.

## Editor's Notebook

*(continued)*

Yorkshire IH dealer. (I met him once and sized him up as nobody to fool with. I was right.) Calvert had demonstrated an IH tractor to a customer, who said he would buy it. Nothing was signed, but they shook hands on the deal. Later, Calvert told AMJ, the farmer contacted him and said to forget it, he had a better offer from another IH dealer.

For most dealers, that's that. But George Calvert, against advice about good customer relations, took the farmer to court—*and won!*

Second was a piece of commentary by Michael Rose, AMJ's editor. He was taking a look at the condition of those tractor companies in Britain who are in trouble—that is, all of them.

"But what are these people doing to resolve their problems? Precious little, as I see it. All they do is complain about each other's marketing strategy and then match or offer even greater discounts to get the metal moving.... The multi-national companies are often accused of being trans-national pirates with power greater than governments. At least governments, faced with this problem, would get around the conference table and discuss their problems. Is it such a revolutionary proposition that the tractor suppliers in this country might care to do just that?....Action is needed to make secure both the long term stability of tractor makers and the profitability of their dealers. This journal is willing to provide the venue for a round table discussion...."

I am a total dummy about what British law says concerning competing manufacturers sitting down together to find ways to stop undercutting each other on price. But I do know that if such a joining of hands were tried over here, and it was discovered, the participating manufacturers would soon be joining hands in the Federal prison exercise yard. It might be possible for Mike Rose and AMJ to offer a place for such a meeting in the U.K. Over here, the best I&T could do would be to promise to send those industry leaders a carton of cigarettes a month, or perhaps a batch of fudge, should they be nabbed by the Anti-Trust Div. of the Justice Dept.

And so, whatever may be possible in the U.K. under British law, producers in the U.S. are destined to lock horns in competitive battle, like bull elks in mating season, until the herd is thinned out. Don't ask me if it's what's best for the economy, the society, companies, workers, dealers, customers, investors and retirees. It's just the way it is.

As for you, George Calvert, several thousand North American dealers are going to toast you when they read of your victory. Many of them have been punched around unmercifully on deals by certain farmers throughout their careers, but I doubt that any will try to emulate your stout-hearted action. Law or no law, no American dealer wants to go into a county court and try to convince a farmer-laced jury that it's wrong for a customer to break his word to a merchant.

Thus, the two ideas, worthy in principle as they may be, probably won't be attempted on this side of the ocean. Manufacturers and dealers must save their legal expense reserves for the primary battles—against each other.

I&T
SINCE 1886

# AUCTION PRICES OF USED EQUIPMENT

**An exclusive I&T monthly report of actual prices paid recently at these leading national wholesale auctions.**

*Asterisk beside tractor price indicates highest bid offered on tractors which were not sold.*

## ENLOW AUCTION CO.
## Tulsa, Oklahoma
## Sept. 10, 1983

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| D-14, 1958 (Good) | 1250 |
| D-17 diesel, 1960 (Good) | 1450 |

**FERGUSON TRACTORS**

| | |
|---|---|
| 30, 1950 (Good) | 1350 |
| 30, 1951 (Fair) | 1100 |

**CASE TRACTOR**

| | |
|---|---|
| 870 diesel, 1972 (Good) | 4650 |

**FORD TRACTORS**

| | |
|---|---|
| 9N, 1942 (Fair) | 750 |
| 9N, 1942 (Fair) | 700 |
| 9N, 1943 (Good) | 1000 |
| 9N, 1944 (Fair) | 790* |
| 9N, 1944 (Fair) | 675 |
| 9N, 1945 (Fair) | 700 |
| 9N, 1945 (Good) | 1250 |
| 9N, 1946 (Good) | 1350 |
| 9N, 1947 (Good) | 1150* |
| 9N, 1947 (Good) | 1275 |
| 9N, 1947 (Good) | 1325 |
| 8N, 1948 (Good) | 1500 |
| 8N, 1948 (Fair) | 950* |
| 8N, 1948 (Fair) | 1200* |
| 8N, 1949 (Good) | 1425 |
| 8N, 1949 (Good) | 1650 |
| 8N, 1950 (Good) | 1375 |
| 8N, 1950 (Fair) | 1100 |
| 8N, 1951 (Good) | 1500 |
| 8N, 1951 (Rough) | 750 |
| 8N, 1952 (Fair) | 1150 |
| 8N, 1952 (Good) | 1400* |
| 8N, 1952 (Rough) | 850 |
| 8N, 1952 (Good) | 1500 |
| NAA, 1953 (Good) | 1875 |
| NAA, 1953 (Fair) | 1610* |
| NAA, 1954 (Good) | 2125 |
| 601, 1957 (Good) | 2050 |
| 671, 1958 (Good) | 2300 |
| 800, 1955 (Fair) | 1650* |
| 800 diesel, 1956 (Good) | 1950 |
| 850, 1956 (Good) | 1900 |
| 850, 1956 (Good) | 2100* |
| 850, 1956 (Fair) | 1400* |
| 801, 1958 (Fair) | 1500 |
| 960, 195[illegible] (Good) | 2125* |
| 2000, ldr., 1969 (Good) | 3850* |
| 3000 LP, 1967 (Fair) | 2100 |
| 3500, 1968 (Good) | 2800* |
| 4400, backhoe, 1969 (Good) | 4100 |
| 5000 diesel, Select-O-Speed, 1965 (Fair) | 2500* |
| 5000 diesel, ldr., 1968 (Good) | 5150 |

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| W-450, 1957 (Good) | 475* |
| Cub, 1956 (Good) | 1450 |
| 154, 1968, (Fair) | 1280 |
| 154, 1970 (Good) | 1800 |
| 354, 1972 (Fair) | 1325 |
| 464, 1975 (Good) | 3200* |
| 2424, 1965 (Good) | 2900 |
| 544, 1971 (Good) | 4250 |
| 574 diesel, ldr., 1976 (Good) | 5250 |
| 1066 diesel, 1973 (Good) | 4350* |
| 1256 diesel, 1968 (Good) | 5010* |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| 70, 1954 (Good) | 1350 |
| 430, 1959 (Good) | 1150 |
| 1020 diesel, 1973 (Good) | 4000 |
| 1520 diesel, 1970 (Good) | 3850* |
| 2010 diesel, ldr., 1961 (Good) | 3125 |
| 2510 diesel, 1968 (Good) | 4625 |
| 3010 diesel, 1963 (Good) | 4200 |
| 4020 LP, 1965 (Fair) | 3550* |
| 5020 diesel, 1964 (Fair) | 3950 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 35, 1961 (Good) | 2000 |
| 50, 1958 (Fair) | 1800 |
| 50 LP, 1960 (Good) | 2250* |
| 50 diesel, 1962 (Good) | 2750* |
| 50, 1963 (Rough) | 1570* |
| 50, 1963 (Good) | 2550 |
| 65 LP, 1960 (Good) | 1890* |
| 65, 1962 (Fair) | 1650* |
| 65 diesel, ldr., 1962 (Good) | 3250 |
| 65 LP, 1963 (Good) | 1850 |
| 65, 1963 (Good) | 2900 |
| 135, 1965 (Fair) | 2600 |
| 135 diesel, 1972 (Good) | 3750* |
| 165 diesel, 1966 (Fair) | 2950 |
| 165, 1968 (Good) | 3300 |
| 165 diesel, 1971 (Good) | 4100* |
| 165 diesel, 1972 (Good) | 4400 |
| 180 diesel, 1967 (Good) | 3300 |
| 40 diesel, 1975 (Good) | 5525 |
| 240 diesel, 1983 (New) | 8350 |
| 240 diesel, 1983 (New) | 8350 |
| 245 diesel, 1983 (New) | 9100* |
| 245 diesel, 1983 (New) | 9350 |
| 255 diesel, 1975 (Good) | 5850* |
| 255 diesel, 1976 (Good) | 6300 |
| 275 diesel, 1976 (Good) | 7100 |
| 275 diesel, 1978 (Good) | 7200* |

**OLIVER TRACTORS**

| | |
|---|---|
| 550, 1964 (Good) | 1350 |
| 550 diesel, 1970 (Good) | 1850 |
| 1250 diesel, 1968 (Fair) | 1750* |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| U-B, 1954 (Fair) | 350* |
| M-670 diesel, 1969 (Good) | 3750 |
| G-900 diesel, 1967 (Good) | 3250* |
| G-1000 diesel, 1968 (Fair) | 4100* |

## YODER & FREY, INC.
## Archbold, Ohio
## August 9, 1983

**INTERNATIONAL HARVESTER TRACTORS**

| | |
|---|---|
| A, 1945 (Good) | 800* |
| 154 Lo-Boy, mo., (Fair) | 2000 |
| C, 1950 (Fair) | 800 |
| Sup. C, 1952 (Fair) | 760 |
| H, 1945 (Fair) | 550* |

*(Continued on page 24)*

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O-RING PORTS
STOP THE DROP

Write in (12) on Reply Card

## Auctions *(Continued from page 4)*

| | |
|---|---|
| H, 1946 (Good) | 700* |
| H, 1943 (Rough) | 570 |
| M, | 470 |
| M, 1950 (Fair) | 750* |
| 300, 1956 (Rough) | 880 |
| 460, 1962 (Fair) | 1050* |
| 560 diesel, 1960 (Fair) | 2000* |
| 574, 1972 (Rough) | 3700 |
| 706, 1966 (Fair) | 2950 |
| 706, 1966 (Good) | 3150* |
| 706, 1965 (Fair) | 2400 |
| 706, 1965 (Fair) | 2400 |
| 806, 1963 (Rough) | 2000* |
| 806 diesel, 1965 (Rough) | 3225 |
| 806 diesel, 1966 (Fair) | 4300* |
| 826 diesel, 1970 (Fair) | 5600* |
| 856 diesel, 1966 (Fair) | 5300* |
| 1066 diesel, 1974 (Fair) | 6100 |
| 1086 diesel, 1979 (Good) | 12,500* |
| 1256 diesel, 1970 (Fair) | 6000 |
| 1466 diesel, 1975 (Good) | 8000* |
| 1486 diesel, 1980 (Excellent) | 14,500* |
| 1566 diesel, 1975 (Good) | 8750* |
| 4166 diesel, 1972 (Fair) | 11,000* |

**OLIVER TRACTORS**

| | |
|---|---|
| 77, | 450 |
| 770 diesel, 1959 (Rough) | 850 |
| 1800 diesel, 1961 (Rough) | 1550* |
| 1855 diesel, (Good) | 4100* |

**WHITE TRACTORS**

| | |
|---|---|
| 2-150 diesel, 1977 (Fair) | 5500* |
| 2-150 diesel, 1976 (Fair) | 9300 |

**STEIGER TRACTOR**

| | |
|---|---|
| Panther III diesel, 1981 (Good) | 32,500 |

**JOHN DEERE TRACTORS**

| | |
|---|---|
| G, 1951 (Fair) | 580 |
| LA, mo., plow, 1946 (Fair) | 800* |
| 60, 1954 (Fair) | 1200* |
| 60, 1953 (Rough) | 510 |
| 70, diesel, 1958 (Rough) | 1700 |
| 70, 1954 (Rough) | 550* |
| 420, cult., | 1750 |
| 420, 1957 (Rough) | 1450* |
| 430, 1958 (Rough) | 1125 |
| 1010 diesel, 1963 (Fair) | 1550 |
| 2010 diesel, 1962 (Fair) | 2400* |
| 2010, 1963 (Rough) | 2250* |
| 2020, (Fair) | 4025 |
| 3020 diesel, 1968 (Good) | 4700* |
| 3020 diesel, 1969 (Good) | 5500* |
| 3020, 1967 (Fair) | 2900 |
| 4010, 1963 (Rough) | 3100* |
| 4010 diesel, 1964 (Fair) | 3100* |
| 4010, 1962 (Fair) | 2500* |
| 4020 diesel, 1966 (Rough) | 4150* |
| 4020 diesel, 1967 (Fair) | 4500* |
| 4020 diesel, 1967 (Excellent) | 6800* |
| 4020 diesel, 1966 (Rough) | 4700* |
| 4020 diesel, 1967 (Fair) | 5600* |
| 4020 diesel, 1968 (Good) | 6850* |
| 4020 diesel, 1969 (Fair) | 5600* |
| 4020 diesel, 1965 (Rough) | 3800* |
| 4440 diesel, 1980 (Excellent) | 15,500* |
| 4440 diesel, 1979 (Fair) | 13,000* |
| 4620 diesel, 1971 (Good) | 8750* |
| 4630 diesel, 1973 (Excellent) | 13,000* |
| 7520 diesel, 1974 (Fair) | 11,000* |
| 8640 diesel, 1977 (Good) | 18,000* |

**FERGUSON & MASSEY FERGUSON TRACTORS**

| | |
|---|---|
| TD-20, | 525 |
| 65, 1957 (Fair) | 1200* |
| 65, ldr., 1960 (Fair) | 3000* |
| 100 diesel, 1969 (Rough) | 3500* |
| 165, 1970 (Fair) | 3050* |
| 165, 1969 (Fair) | 2800 |
| 165, 1972 (Good) | 3500* |
| 1100 diesel, 1967 (Rough) | 2800* |

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 1200 diesel, (Rough) | 4500 |
| 1210 diesel, (Good) | 3925 |

**FORD TRACTORS**

| | |
|---|---|
| 9N, | 700 |
| 601, 1956 (Fair) | 1700 |
| 901, 1957 (Fair) | 950 |
| 550, 1955 (Good) | 2350 |
| 550, 1957 (Fair) | 2550* |
| 2000, | 1175 |
| 3000, ldr., 1969 (Rough) | 2600 |
| 4000 diesel, 1970 (Rough) | 3000* |
| 4000, 1973 (Good) | 3300* |
| 4000 diesel, 1971 (Good) | 3500* |
| 4000, ldr., | 1950 |
| 5000 diesel, 1970 (Rough) | 3200* |
| 5000 diesel, 1969 (Rough) | 4500 |
| 6000 diesel, 1963 (Rough) | 1100* |
| 9600 diesel, 1974 (Fair) | 7600* |
| 6600 diesel, (New) | 8800* |

**ALLIS-CHALMERS TRACTORS**

| | |
|---|---|
| WD, 1946 (Fair) | 525* |
| WD, 1947 (Rough) | 575 |
| D-15, 1967 (Good) | 2500* |
| D-21 diesel, 1967 (Fair) | 3700* |
| 220 diesel, 1974 (Fair) | 4700* |
| 7000 diesel, 1974 (Good) | 7700* |
| 7040 diesel, 1974 (Good) | 9000* |

**MINNEAPOLIS-MOLINE TRACTORS**

| | |
|---|---|
| Jet Star 3, | 125 |
| M-670, 1967 (Fair) | 1325 |
| M-670, 1967 (Fair) | 2400* |
| G-705 diesel, 1967 (Rough) | 1400* |
| G-707 diesel, (Rough) | 1700* |
| UB, 1950 (Fair) | 1000* |

**CASE TRACTORS**

| | |
|---|---|
| 500, 1956 (Rough) | 1000* |
| 600 diesel, 1957 (Fair) | 1150* |
| 730, 1965 (Rough) | 1575 |
| 830 diesel, 1965 (Good) | 1675 |
| 870, 1977 (Fair) | 4775 |
| 1030 diesel, 1968 (Fair) | 3400 |
| 1370 diesel, 1972 (Fair) | 9000* |

### JONES FARM EQUIPMENT CO.
### Dothan, Alabama
### August 9, 1983

**DAVID BROWN TRACTORS**

| | |
|---|---|
| 1210 diesel, 1974 (Good) | 2400* |
| 880 diesel, 1967 (Fair) | 1025 |

**MASSEY-FERGUSON TRACTORS**

| | |
|---|---|
| 1155 diesel, cab, duals, 1975 (Good) | 5500 |
| 1155 diesel, 1974 (Fair) | 3600* |
| 1085 diesel, 1974 (Fair) | 4100* |
| 1080 diesel, 1972 (Rough) | 2800 |
| 285 diesel, 1978 (Good) | 5900 |
| 285 diesel, 1978 (Fair) | 4900 |
| 275 diesel, 1976 (Good) | 6500* |
| 178 diesel, (Good) | 4100* |
| 175 diesel, 1970 (Good) | 3600* |
| 165 diesel, 1972 (Good) | 3300 |
| 165 diesel, 1968 (Excellent) | 4400 |
| 165 diesel, 1967 (Good) | 3500* |
| 165 diesel, 1966 (Good) | 3600* |
| 165 diesel, 1966 (Fair) | 2700* |
| 150 diesel, 1967 (Excellent) | 3800 |
| 2135 diesel, 1966 (Rough) | 2100* |
| 135 diesel, 1973 (Good) | 3500 |
| 135 diesel, 1973 (Excellent) | 3950 |
| 135 diesel, 1967 (Good) | 3500 |
| 135 diesel, 1966 (Rough) | 1700* |
| 135 diesel, 1966 (Good) | 3425 |
| 130 diesel, 1968 (Fair) | 1750 |
| 65 diesel, 1963 (Good) | 2100* |
| 65 diesel, 1962 (Good) | 1600 |

*(More...)*

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Jim Hale, North Washington Implement Co. Lynden, WA

"The fact is, I'm getting more out of my DIS computer package than I expected. Of course it saves us money by reducing paperwork. But it also has helped me improve cash flow.

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DIS

INFORMATION MANAGEMENT PROFESSIONALS

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## Auctions

*(continued)*

| | |
|---|---|
| 90 diesel, 1959 (Good) | 1850 |
| 35, 1961 (Excellent) | 2300 |
| 35, 1959 (Good) | 1600 |
| 35, 1959 (Good) | 1900* |
| TO20, 1948 (Rough) | 450 |

### FORD-FERGUSON TRACTORS

| | |
|---|---|
| 9N, 1946 (Good) | 875 |
| 9N, 1946 (Good) | 950* |
| 9N, 1946 (Excellent) | 1300 |

### FORD TRACTORS

| | |
|---|---|
| 8000 diesel, 1970 (Good) | 3850* |
| 8000 diesel, 1970 (Good) | 4000 |
| 7000 diesel, 1973 (Good) | 5400* |
| 6000 diesel, 1963 (Good) | 1250 |
| 5000 diesel, 1972 (Excellent) | 5350 |
| 5000 diesel, 1968 (Fair) | 3800 |
| 5000 diesel, 1968 (Good) | 4600* |
| 5000 diesel, 1968 (Good) | 4600* |
| 5000 diesel, 1966 (Fair) | 3600 |
| 4400 diesel, Select-O-Speed, 1966 (Rough) | 1150 |
| 4000 diesel, 1968 (Good) | 3250 |
| 4000 diesel, 1968 (Good) | 3800 |
| 4000 diesel, 1966 (Rough) | 2000 |
| 4000 diesel, 1966 (Fair) | 3000* |
| 4000 diesel, Ind. 1966 (Fair) | 1900 |
| 3000 diesel, 1968 (Good) | 3100* |
| 2000, 1964 (Rough) | 1000* |
| 850, 1956 (Rough) | 650 |
| 941, corn picker, 1958 (Fair) | 1300* |
| 641, 1958 (Good) | 1750 |
| 231 diesel, (Good) | 2900 |
| Sup. diesel, 1962 (Good) | 1500 |
| Sup. diesel, 1962 (Good) | 1700* |
| NAA, 1954 (Fair) | 1275 |
| 8N, 1952 (Good) | 1550 |
| 8N, 1950 (Excellent) | 1700 |
| 8N, 1948 (Good) | 1225* |

### INTERNATIONAL HARVESTER TRACTORS

| | |
|---|---|
| 1256 diesel, 1968 (Rough) | 3600* |
| 1086 diesel, cab, duals, 1977 (Excellent) | 10,000 |
| 1066 diesel, 1971 (Fair) | 5100* |
| 1066 diesel, duals, 1971 (Rough) | 4750 |
| 996 diesel, 1976 (Good) | 7500 |
| 656 diesel, 1968 (Fair) | 3250* |
| 574 diesel, 1973 (Good) | 4100* |
| 574 diesel, 1973 (Fair) | 2850 |
| 574 diesel, 1973 (Fair) | 3350 |
| 504 diesel, 1964 (Excellent) | 2600* |
| 504 diesel, 1962 (Rough) | 1100* |
| 464 diesel, 1974 (Good) | 3500* |
| 364 diesel, 1974 (Fair) | 2700* |
| 364 diesel, 1974 (Rough) | 1550 |
| 350, 1956 (Fair) | 525 |
| 300, 1955 (Good) | 1250 |
| Sup. A, mo., 1948 (Fair) | 1050 |
| Cub, cult., plt., plow, mo., 1948 (Good) | 1400 |
| Cub, mo., 1948 (Good) | 1150 |

### JOHN DEERE TRACTORS

| | |
|---|---|
| 5020 diesel, duals, 1968 (Fair) | 3900* |
| 5010 diesel, 1964 (Fair) | 2700 |
| 4630 diesel, cab, duals, 1976 (Excellent) | 9900 |
| 4440 diesel, cab, duals, 1978 (Excellent) | 14,600 |
| 4030 diesel, 1974 (Fair) | 6000 |
| 4020 diesel, 1971 (Good) | 6200* |
| 3020 diesel, 1970 (Good) | 5200 |
| 2440 diesel, 1978 (Good) | 4500* |
| 2040 diesel, 1979 (Excellent) | 5200* |
| 2030 diesel, 1974 (Good) | 4500 |
| 2010 diesel, 1963 (Excellent) | 2125 |
| LA, plow., 1944 (Good) | 450 |

### LONG TRACTOR

| | |
|---|---|
| 384 diesel, (Good) | 2050 |

### LELAND TRACTOR

| | |
|---|---|
| 270 diesel, (Excellent) | 2800 |

### OLIVER TRACTORS

| | |
|---|---|
| 2-105 diesel, 1975 (Good) | 5550 |
| 1650 diesel, 1968 (Rough) | 2175 |
| 1450 diesel, 1967 (Fair) | 1425 |
| 550 diesel, 1958 (Rough) | 750* |

**NOTES:**
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are **not** averages.

Condition Classifications:
**EXCELLENT:** Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

**GOOD:** Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance: good over-all.

**FAIR:** Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance: worn, some dents, minor parts (gage covers, etc.) missing or broken.

**ROUGH:** Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

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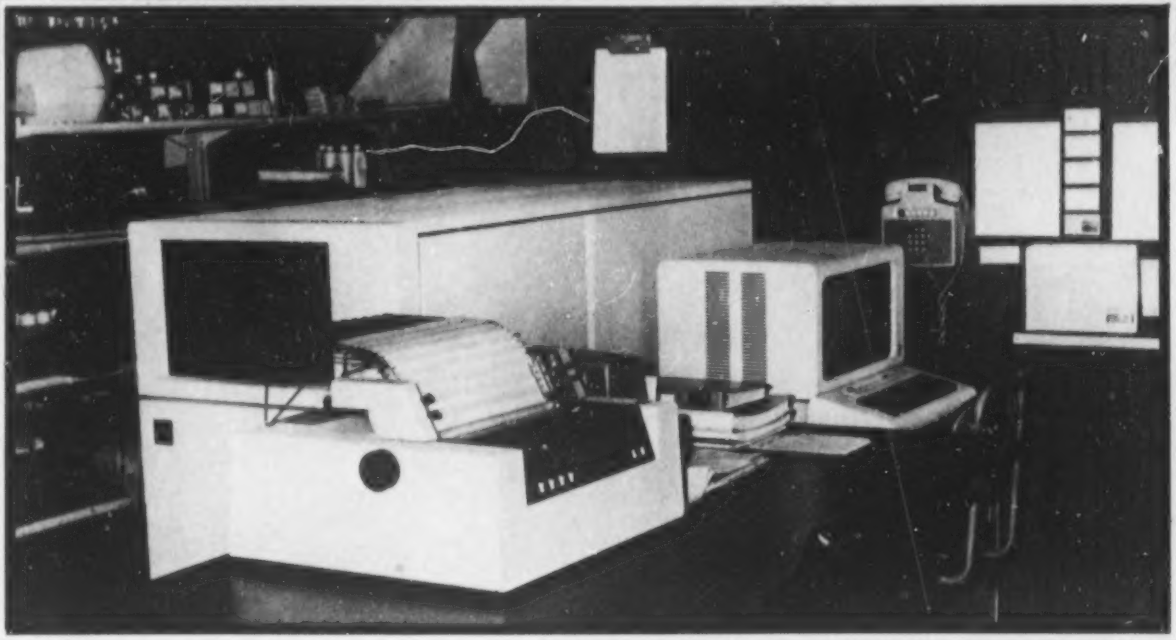

# Bytes and Pieces

Computers are a natural for controlling parts inventory, but finding a system to satisfy the dealer and his main suppliers poses some knotty problems. **By Scott R. Nesbitt**

■THE GOOD news is that dealers have a lot of choices when looking for a computer to control parts inventory.

The bad news is that the choice may involve some politics and problems that go beyond the not-so-simple task of choosing the machine to fit the particular dealership.

Last month, I&T listed 20 vendors of in-house computer systems, and number 21 joined the pack this month. We also found another handful of vendors who, for their own reasons, didn't respond to a data sheet sent to them.

To make this series more useful, this article aims at providing some perspective on how a dealer can best wade through all the words he'll face when getting ready for computerized inventory control.

**What's In This Series On In-House Computers?**

**I – Who Offers What?**

**II – Controlling Inventory**

**III – Management and Sales**

## Info ins and outs

Computers are complex machines with a simple mission: record information, then retrieve it in a manner dictated by program commands. "Software" is the umbrella label for pre-written programs that set up categories for storing and retrieving information.

Almost all systems in our roundup handle the basics needed for in-house inventory control, providing spaces for storing part number, description, shelf quantity, source, cost, price, minimum shelf quantity and sales history. Some systems provide extra spaces for user-defined memos, like cross-references.

The basic retrieval functions are also found in all the packages, covering reports like current stock value, slow-moving parts, and restocking orders. Most will keep track of back orders and special orders.

These systems have, as standard or optional, a remote terminal and printer that can go on the parts counter for looking up parts, printing invoices, checking customer credit, and automatically adjusting the inventory count and the accounts receivable ledger.

Most vendors will call their package of hardware and software a "turnkey" system, implying the dealer just has to fire it up and drive away, with no modifications needed.

But it's obvious each "turnkey" designer had a different door in mind.

## Extra goodies

Beyond the basics, the various systems offer a bewildering array of

*(More...)*

### The Case For Control

Why control parts inventory as tightly as possible?

Check out these figures, showing that parts with no sales in 12 months or more accounted for half of parts stock.

The numbers come from a September, 1982, NFPEDA survey that analyzed the inventory of 230 ag and industrial dealers who used the association's computerized parts pad service. The figures are averages.

Note that non-returnable parts were about a fifth of the total stock, but this category includes belts, hoses, seals and gaskets that may be fast movers but are not returnable.

| | Pieces | Part Numbers | Today's Cost | Per cent of Cost |
|---|---|---|---|---|
| Stock parts | 28,890 | 6,448 | $206,479 | ..... |
| Stock sales (one month) | 780 | 378 | 8,682 | 4.2 |
| Stock receipts | 886 | 218 | 5,550 | 2.7 |
| Emergency receipts | 25 | 21 | 549 | 0.3 |
| Non-returnable parts | 6,266 | 1,372 | 40,813 | 19.8 |
| Parts that have not moved | | | | |
| 12 through 24 months | 4,187 | 1,136 | 38,269 | 18.5 |
| over 24 months | 8,267 | 2,690 | 67,933 | 32.9 |

## Inventory Computers *(continued)*

pre-programmed reports: out of stock, excess stock, negative quantity, inactive items, descending dollar sales, product locater, FIFO and LIFO calculations, lost sales, type of part by calendar month, warranty usage, sales per employee, sales per customer, sales per bin, cross reference between competing suppliers, and on and on.

Some vendors escalate the battle of reports by including a "report writer" that lets a dealer create customized reports without learning high-level computer programming.

Finding the right computer system requires sorting through the various software offerings to find the one system that best meets specific needs. One sensible, systematic approach involves making three lists that concentrate on the software and reports.

List One includes reports you must have. List Two includes reports you'd like to have. And List Three includes those reports you absolutely won't need and refuse to pay for.

Devote some serious effort to preparing these lists. Software is expensive, and there's no sense buying built-in programs you won't use, and even less sense buying a system that has to be modified (for a fee) to get reports you must have.

### Lots of help

Typically, a dealer will read a brochure, think a bit, ask some questions, then read some more brochures and run through the thinking-asking cycle several times before getting comfortable enough with computers to make a decision.

**Another Vendor Heard From**

The newest provider of inhouse systems usable by dealerships is **ITT Commercial Finance Corp.**, 8251 Maryland Ave., St. Louis, Mo. 63105. Hardware: Apple III computer; printer 120 cps or any compatible unit; storage 5 Mb to 60 Mb; 1 user expandable to 64 in network.

Software: Great Plains Software's Hardisk Accounting series, includes general ledger, profit-loss statements, parts inventory, sale-profit reports, wholegoods inventory, sales commissions, trade-in tracking, payroll, accounts receivable and payable, service department accounting and scheduling. Word processing and other software available. Standard service part number length, 15 characters.

There's plenty of help available from dealer associations, major tractor companies, computer vendors, and other dealers. Problem is, most of these people will also be trying to sell you a computer, and that's where the politics enter the picture.

Although some dealers have been using computers in-house for years, it wasn't until this month that all the "big seven" tractor manufacturers finally endorsed in-house systems for their dealers.

Here are the linkups:

**ADP** with **Allis-Chalmers** and **International Harvester.**

**ADS** with **John Deere.**

**DIS** with **J I Case, Ford, Massey-Ferguson** and **White.**

While details of these endorsements vary (you expected a uniform industry policy?) there are some basic provisions.

The computer company will give dealers electronically-readable tapes or disks to feed in-house computers with updated parts price lists, superceded part numbers, and other information.

When the companies start up their planned *dealer communication networks,* they will be built around the endorsed computer.

The endorsed system may be sold to the dealer at a discount, often with factory financing help.

### Dealer's choice

Does this mean the dealers should stop considering anything but an endorsed system? Don't count on it.

What about the dealer who handles several tractor lines, who might have a choice of two or three endorsed systems?

What about the dealer who leads his regional dealer association, and advocates the association's computer?

What about the prosperous dealer who got his own computer years ago, and the dealer who sells his system to other dealers? Will factories try to punish the pioneers by making them switch?

And how about the dealers who are just plain ornery, or cagey, or have read George Orwell's *1984*? Maybe they don't want a factory computer snooping inside their inhouse machine. Far fetched, perhaps, but one tractor company

*(Continued on page 28)*

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## Inventory Computers

(Continued from page 10)

says its planned communication network will "treat parts inventory as one entity, whether the actual part needed is on a dealer's shelves, in the depot, or at the factory."

### Language barriers

Most factory computer planners acknowledge that their endorsed systems are a relatively standardized package, and won't necessarily match the needs of every dealer. That means some dealers may be better served by a non-endorsed system.

The potential diversity of computer brands within one tractor line's dealer network raises some problems, because computers don't all speak the same language. A factory price update might be sent to dealers on a floppy disk prepared for computer Brand X, but the dealer with computer Brand Y may find his machine can't read the disk.

The tractor makers are still formulating policies on this language issue, but the general feeling runs like this: "We have our contracts with the dealers, and we'll supply information to them, not to some outside computer vendor. It's up to the dealer to get the thing translated, if he needs to."

### What lies ahead

Next month our series will cover management and sales tools offered in the various systems, with a look at what the systems sell for. I&T

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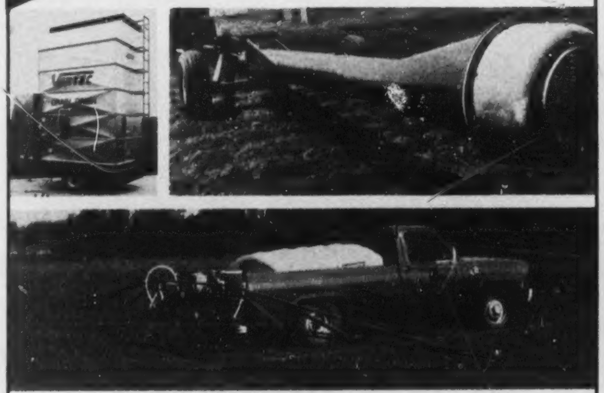
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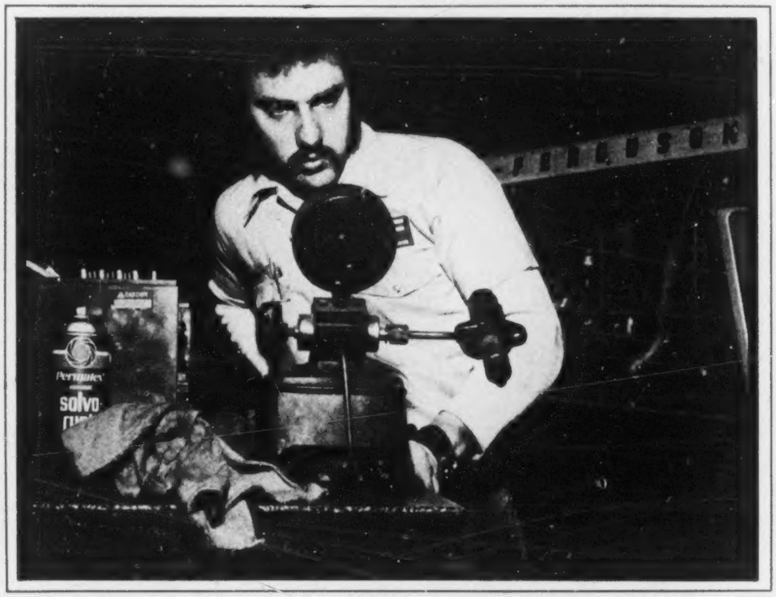
# Comparing your shop's performance

**By Richard A. Edwards**

Agribusiness Economist, Texas Ag Extension Service



■IF YOU are concerned about your service department's profitability trend (negative for most dealers), you should investigate these areas: hours of operation, shop rates, and productivity.

With improvements made in the Cost of Doing Business study of the National Farm & Power Equipment Dealers Assn., it's now possible for dealers to compare their shops with others of a similar size. If differences appear among various size categories, perhaps reasons can be identified and steps taken for improvement.

Table I shows data on four different-size operations for 1981 and 1982. One of the trends to be noted is that the higher-volume shops have a much higher billing efficiency (which is the actual income per hour divided by the shop rate) than shops of the lower volume dealerships. The big-dealership shops also have higher shop labor rates.

And Table II shows us that the "high-profit" dealerships usually have a *poorer* performance with regard to billing efficiency than average dealerships in their volume category.

## Volume/efficiency

Why should the shops of larger

*(More...)*

**Table I: Shop Performance and Dealership Volume**

| Dealership Volume, All Sales | Weekly Labor Sales per Serviceman | | Weekly Hours of Shop Operation | | Customer Shop Rates | | Billing Efficiency | | Top Mechanic Wages | | Number of Servicemen | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1982 | 1981 | 1982 | 1981 | 1982 | 1981 | 1982 | 1981 | 1982 | 1981 | 1982 |
| Less than $1 million | $386 | $385 | 43.9 | 44.0 | $17.95 | $18.53 | 48.9% | 47.2% | $6.66 | $6.65 | 2.36 | 2.58 |
| $1-2 million | 439 | 484 | 45.7 | 45.4 | 18.59 | 19.67 | 51.6 | 54.3 | 7.18 | 7.25 | 4.25 | 4.50 |
| $2-3 million | 529 | 555 | 46.1 | 46.4 | 20.53 | 20.73 | 56.8 | 57.7 | 7.72 | 7.67 | 6.07 | 6.08 |
| $3+ million | 641 | 662 | 46.6 | 46.4 | 21.66 | 22.67 | 63.5 | 63.0 | 8.35 | 8.74 | 9.32 | 9.55 |

Source: Cost of Doing Business Study, 1981, 1982, by National Farm & Power Equipment Dealers Assn., 10877 Watson Rd., St. Louis, MO 63127.

G4200H, 12 hp diesel engine.

AND EVERYTHING IN-BETWEEN.

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And we don't just put our name on a tractor we build the tractor from the ground up.

## Shop Performance.

*(continued)*

dealerships be more efficient than smaller ones? The raw data provided in the Cost of Doing Business study must be equalized to address this issue. The study has always provided shop sales per serviceman, but to compare these values, one must equate the hours of operation and the shop rate, which determine the labor sales volume.

The study since 1981 provides both of these bits of information, and with this data the sales can be measured in dollars generated per operational hour. This value, in turn, can be compared to the shop rate to determine the shop's billing efficiency. Table I clearly indicates that in each of the past two years, the higher the volume, the more productive in terms of billing out the work.

Why is this? The hours worked and hourly rates have been normalized, so we must look to other explanations. Several come to mind. Larger shops can often justify the purchase of specialized equipment. Larger shops can also assign the mechanics into specialized areas where they are more proficient. Higher volume usually dictates a non-working supervisor who undertakes several tasks, non-revenue producing, which are now handled by mechanics. (Under the CODBS

### Table II: Billing Efficiency—a High-Profit Flaw

| | Less than $1 Million | | $1-2 Million | | $2-3 Million | | Over $3 Million | |
|---|---|---|---|---|---|---|---|---|
| | Average | High-Profit | Average | High-Profit | Average | High-Profit | Average | High-Profit |
| 1981 | 48.9% | 47.9% | 51.6% | 47.8% | 56.8% | 61.4% | 63.5% | 59.4% |
| 1982 | 47.2% | 42.2% | 54.3% | 46.2% | 57.7% | 55.6% | 63.0% | 63.3% |

Source: Cost of Doing Business Study, 1981, 1982, by National Farm & Power Equipment Dealers Assn., 10877 Watson Rd., St. Louis, MO 63127.

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only the working mechanic's time is used in the calculations.) A larger backlog of jobs is more probable with larger volume dealers. This insures a continual work flow, and scheduling is much easier.

Thus, one can conclude that the economy of size works in favor of the larger shops. Efficiencies in use of personnel, specialized equipment, and managerial functions favor higher volume dealers. The data certainly supports this conclusion.

### Rate differences

Customer labor rates for 1982 ranged from $18.53 to $22.67 from low to high sales-volume dealers. The same trend was evident in the 1981 data. The higher volume dealers also increased their rates more from the previous year than did the other categories.

The high-volume dealers certainly pay higher wages, and this explains some of the difference. Another rationalization is that higher volume dealers have a larger overhead burden and need the higher rate. Arguments relating to location and competition and their effect on shop rates are also given as reasons for different rate structures. These all have merit, but consider this:

Perhaps the large-volume dealers have a better system of cost allocation and recognize the need for higher rates. This is mentioned with some hesitation because of losses that most shops incur. Rates should be about 30 to 40 per cent greater than they actually are.

Regardless of the cause, low-volume dealers should not be reluctant to charge the same rates as their larger counterparts.

### High profit dealers

In general, the group that the CODBS identifies as high-profit dealers are so called because the dealerships' overall percentage of net profit to sales is in the top 25 per cent of each sales volume group. Using the same analysis techniques on this category of dealers, the data suggest that these dealers, on the average, have poorer performing shop operations (Table II).

Causes for this can be only speculated upon. The first to come to mind is that management's efforts have been concentrated in areas other than the shop. The relatively poor shop performance of high-profit dealers serves to indicate that shop operations need continual monitoring. Attention only to sales functions can and will lead to increased profit leakage from the shop.

### Do it yourself

To compare your shop with the CODBS, you need the following information:

- Annual shop sales
- Number of servicemen
- Weekly number of hours the shop is open
- Your customer shop rate.

First, divide the annual shop sales by the number of servicemen. Then, divide this value by 52 weeks. This gives you the average sales per week for each serviceman. The weekly sales is then divided by the hours your shop is open each week. The result is the average hourly income. Billing efficiency is found by dividing the hourly income by the customer shop rate.

Now your billing efficiency can be compared with those of the same size dealers in Table I. I&T

## Do Shortliners See It the Same as Dealers?

Percentage of shortliners

Percentage of dealers

| | Strongly agree | Agree | No opinion | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Shortliner (or distributor) usually has adequate service backup, including training. | 2<br>3 | 61<br>50 | 7<br>4 | 29<br>38 | 1<br>4 |
| Shortline products' appearance often deteriorates too fast, makes selling harder. | 12<br>10 | 38<br>40 | 17<br>15 | 31<br>32 | 2<br>3 |
| Shortline products generally produce attractive margin of profit. | 22<br>4 | 67<br>48 | 5<br>9 | 6<br>34 | 0<br>4 |
| Distributor sales reps usually know the products in their catalog sufficiently. | 1<br>5 | 16<br>68 | 10<br>6 | 61<br>18 | 12<br>3 |
| Shortline products generally priced lower than competing longline products. | 18<br>10 | 62<br>57 | 13<br>12 | 6<br>19 | 0<br>1 |
| Major manufacturer generally has more attractive finance package than shortliners. | 33<br>39 | 56<br>52 | 8<br>4 | 3<br>4 | 0<br>1 |
| Shortline suppliers generally give the dealer more territory on a line than majors do. | 9<br>4 | 53<br>26 | 24<br>14 | 13<br>45 | 0<br>10 |
| Shortline product parts service generally equals or is better than that of major. | 12<br>1 | 42<br>22 | 17<br>15 | 28<br>48 | 1<br>13 |

**Sometimes yes, sometimes no.** Two years ago, we asked dealers if they agreed or disagreed with 19 statements we put forth about shortliners and their products. This year, we selected eight of those statements and put them to shortliners. What you see here in each of the boxes is how the shortliners and the dealers replied, in percentage figures.

**Service adequacy:** Dealers' view of shortliner service backup wasn't as favorable as the shortliners' view, but it was still positive. Disagreement by 30 per cent of shortliners indicates that it's a matter of fairly serious concern.

**Product appearance:** The manufacturers are almost exactly in line with dealers on this one: they see the problem as real.

**Attractive margins:** A majority of dealers agreed, but not as overwhelmingly as did the shortliners.

**Distributor's salesman:** Sharp divergence. Most dealers think the distributor reps know their stuff, while shortliners are very negative. But elsewhere in the survey, shortliners agree that wholesalers and reps have an adequate knowledge of users' equipment practices and needs, and more agree than disagree that wholesalers and reps are frequently the source of good ideas for product improvements or new products.

**Shortline prices:** Dealers and shortliners are generally agreed that a price advantage exists for the shortliner's product compared with the major's.

**Finance packages:** Both groups agree that shortliners are at a disadvantage.

**Retail territory:** Dealers are less impressed by territory sizes than shortliners are. Is this divergence to be expected?

**Parts service:** A modest shortliner majority think their parts backup performance at least matches the majors. A stronger dealer majority think they don't.

One respondent suggested that what dealers thought about shortliners two years ago may have significantly changed. So next time we consider these subjects, we'll survey dealers and shortliners at the same time.

# Shortline manufacturers surveyed:
# Their distribution
# The trends they see
# Their views compared with dealers' views

**I&T study of North American members of FEMA reveals vast divergence of outlook. Will distributors and dealers resume inventory stocking? Will major manufacturers do more "house brand" marketing?**

**By Bill Fogarty**

■"THIS questionnaire," the man wrote, "is generally poorly prepared. Vague, inappropriate questions."

Nevertheless, he and 121 other North American shortline manufacturers were kind enough to fill it out and send it back. Though not required, many signed their names.

The critic may have been at least partly right. I&T's staff had to do the survey in a hurry because another editorial project fell through and this was a late substitute. But some of those "vague,

(Continued on page 43)

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## Shortliner Survey

*(Continued from page 18)*

inappropriate" questions produced very clear, pertinent answers. Some were easy to quantify. Others were not, nor were they intended to be. Instead, I&T sought comments and opinions on several key issues that shortliners may be facing now or in the near future. We got what we were after, which were some fresh insights about the marketplace.

Here are some general impressions:

- Many shortliners are deeply concerned that distributors and dealers have cut back severely on stocking inventory. A few talk of going direct—not just direct to dealers but direct to farmers.
- Shortline manufacturers have made many changes in their approaches to distribution in the past three years, but in no single direction that was readily definable. Three of every four North American shortliners made some kind of change. They told us they were using less or more of their own people or wholesalers or manufacturers' reps or had juggled the combinations thereof.
- In considering independent wholesalers or reps to carry their lines, shortliners care most about the enterprise's reputation for strong marketing efforts, its reputation among dealers and its credit standing. The size of the business and its territory are far down on the list.
- A strong majority of shortliners don't want long-term contracts with wholesalers or reps that require either party to give extensive notice of termination.
- Though shortliners generally don't think wholesaler and rep sales personnel know the products they handle well enough, they credit them for knowing enough about farmers' needs and for being good idea sources on new products.

The survey was mailed out to 383 regular members of the Farm Equipment Manufacturers Assn. who have a North American base. Overseas FEMA members were not surveyed because of short response time available and because their distribution options are generally different.

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## Shortliner Survey

*(continued)*

### Distribution

I&T asked shortliners to indicate if they used wholesalers, manufacturers' reps, their own direct-to-dealer people, or combinations. Here's how it broke down:

| Method | No. | Pct. |
|---|---|---|
| Wholesalers only | 11 | 9 |
| Reps only | 1 | 1 |
| Own people only | 6 | 5 |
| Wholesalers, reps | 21 | 17 |
| Wholesalers, own | 28 | 23 |
| Reps, own | 11 | 9 |
| Wholesalers, reps, own | 44 | 36 |

And then we asked the shortliners to indicate whether they were using more, less or the same number of wholesalers, reps and their own people than they were using three years ago.

Only one in four—31 companies—indicated there had been no changes. All 11 (9 per cent) who use wholesalers only and all six (5 per cent) who use their own people exclusively had made no changes.

Beyond that, there was no firm definition in the moves the shortliners had made or were making. Just about every possible variant of change was indicated: More reps, same wholesalers, fewer of own people; or same reps, more wholesale, more own people, etc.

When we tallied "net mentions" in the more-less-same section we got this:

|  | More Use | Less Use | Same |
|---|---|---|---|
| Wholesalers | 20 | 29 | 50 |
| Reps | 31 | 14 | 20 |
| Own People | 31 | 10 | 39 |

Asked to give reasons for their decisions to change, respondents provided thoroughly diverse answers. Failure of distributors to stock inventory, need to expand, financial problems of distributors, costs, margin squeezes, unavailability of distribution in certain areas, and product conflicts were all mentioned.

The numerical profile tends to indicate a moderate shift away from wholesalers and toward more use of reps and direct to dealer. But our acceptance of the numbers is reserved. For one thing, not one respondent indicated that any changes were a result of a wholesaler's or rep's decision to discontinue the manufacturer, a situation which takes place occasionally.

I&T has heard shortline manufacturers express general dissatisfaction with distributor performance for many years, but despite frequent shifts in manufacturers' approaches to distribution, the distributor segment of this business appears substantially stable.

The fact can't be argued, however, that strong feelings exist—at least among these respondents. There is no way of telling if the feelings are as strong among nonrespondents.

### Desirable traits

We asked the shortliners to rank various characteristics of wholesalers and manufacturers' reps in order of importance. We set up the characteristics, but we left room for additional write-ins. Here's how they ranked them:

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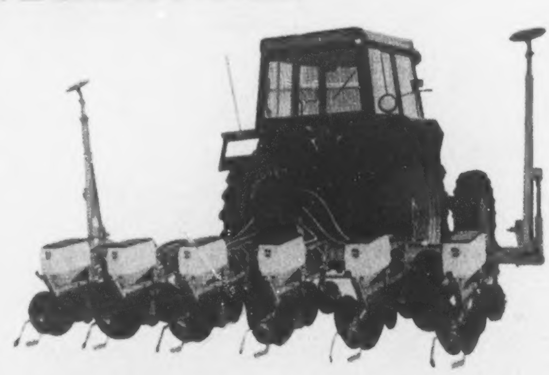

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1. Reputation for aggressive, successful efforts.

2. Reputation among dealers in his area.

3. Financial/credit standing.

4. Track record or indicated willingness to pioneer new products.

5. Specializes in shortliner's product area.

6. Reputation among other manufacturers.

7. Shortline firm's personal knowledge and assessment of distributor's principals.

8. Distributor is small, lean, hungry.

9. Is big, well-established, highly experienced.

10. Covers wide area.

Most write-in characteristics were amplifications of the above. "Absence of competing lines" was written in by three shortliners.

### Hard to find

The shortliners agree very positively that it is usually very difficult to find a capable wholesaler or manufacturers' rep interested in handling the line with competence and vigor.

If I&T had anticipated that the response was going to be that strong, we would have asked for reasons why they found it difficult. Is representation, excellent or otherwise, hard to find, or are there plenty available but few with distinction?

As indicated, earlier, the shortliners agreed, about four to one, that wholesalers and reps have an adequate knowledge of the equipment practices and needs in their areas. And more shortliners agreed than disagreed that wholesalers and reps are often the source of good ideas for product improvements or new products.

The strong opposition among shortliners to the idea of a multi-year, written contract between wholesaler or rep and manufacturer was a puzzle to I&T. The answer may have been found in one shortliner's jotted note: "Not with those buy-back laws!"

### The trends

What's in store for the shortline end of this business? We sought comment on topics more than yes-no answers to specific questions. These included the dealers who sell their stuff, shortliner positioning in relation to the major manufacturers, and their own ultimate survival.

*Will major-franchise dealers continue to dominate as retail outlets for shortline products as much as in the past? Or will more shortline specialty dealers, farm supply stores, etc., handle shortlines?*

Shortline manufacturers split just about evenly in dealing with this. And there [illegible] a middle ground in which they [illegible] the dominance continuing in certain product types and being vastly diminished with others. "Major dealers will continue in high-tech areas," summed up one. More specialty stores, more direct-to-consumer, more farmer-dealers, more chemical stores, said many others.

*Will wholesalers and dealers resume stocking of inventories to earlier sales-ratio levels as business improves? Or will there be a continuation of more drop-shipping, more one-at-a-time ordering?*

Fewer than one in four shortliners expects business improvement to

(More...)

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## Shortliner Survey

*(continued)*

cause a return in the near future to wholesaler/dealer stocking levels of a few years ago. The general feeling is that stocking levels will be rebuilt only very gradually and probably never to common levels of the past. Typical comments:

"There will be tighter inventory controls by dealers"..."They'll only stock the cheaper items"..."Shortliners who provide on a timely basis will get the business"..."Lower inventories at all levels may be a trend requiring new ideas, such as 'letters of intent' "..."Distributors will become equipment brokers, operate on less margin"..."We must make a push for better inventory levels."

*Will major manufacturers' cutbacks in dealer inventory financing terms make it easier to sell shortlines through their dealers? Or will increased capital demands on dealers by the majors make it tougher for shortliners to get dealer commitment?*

For every three shortliners who see an easier time of it, there are four who think it will be tougher. And there are five who won't call it either way. Many of these confess they ponder the question every day but see no clear picture at this time. Several told us that our question presumed too much—that there hadn't been much of the predicted cutbacks in majors' terms. Some shortliners said they expect things to be neither tougher nor easier, that there will be a balancing.

*Do you expect major manufacturers to buy more equipment from shortliners for "house brand" marketing? Or will they be more likely to focus on their core products and leave allied products marketing to shortliners?*

A third of our respondents expect to see more house-brand marketing. Another third expect major firms to focus more on their core products and stay out of selling the other items. The last third consists of a mixed bag, including those who simply don't know, those who say "both"—frequently depending on whether Deere or some other manufacturer is under consideration.

Because major manufacturers have excess production capacity, two shortliners expect them to *expand* their production of allied lines.

*With fewer dollars in agriculture through the next several years, how will shortliners survive? More diversity within agriculture? More products for non-ag markets? Fierce competition for market share?*

This triggered the widest variety of responses, but the most frequent answer, usually coupled with other observations, was, "Some won't." The respondents, almost all deeply involved in their companies' marketing concerns, spoke frequently of waging intense war for greater market share, of greater diversity both within and without agriculture, yet greater specialization, more innovation and products, tighter and more efficient management.

There's more to this survey, but I&T is saving some of the free-wheeling, open-end responses we received for a later issue. Watch for the December issue, which takes a number of looks ahead at this industry from perspectives that are not ordinary. I&T

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